JANUARY 3, 1955

NEWS ISSUE

Electrical World

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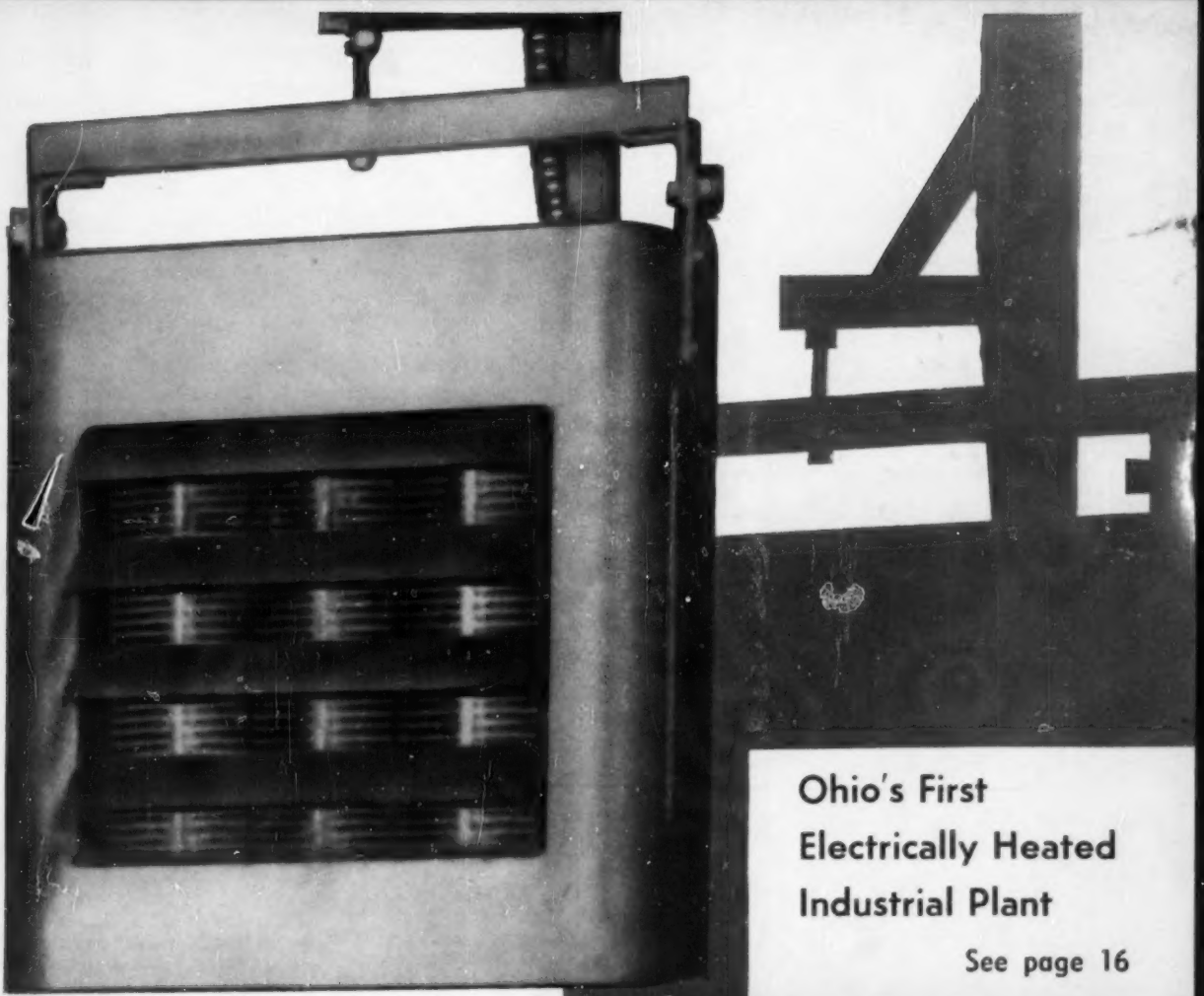

Ohio's First Electrically Heated Industrial Plant

See page 16

Distribution Needs Faster Breakers . . Page 25

English Train Reactor Technicians . . Page 52

Electrical World Changes Format . . . Page 3

E B POWER GS W 12
UNIVERSITY MICROFILMS IN
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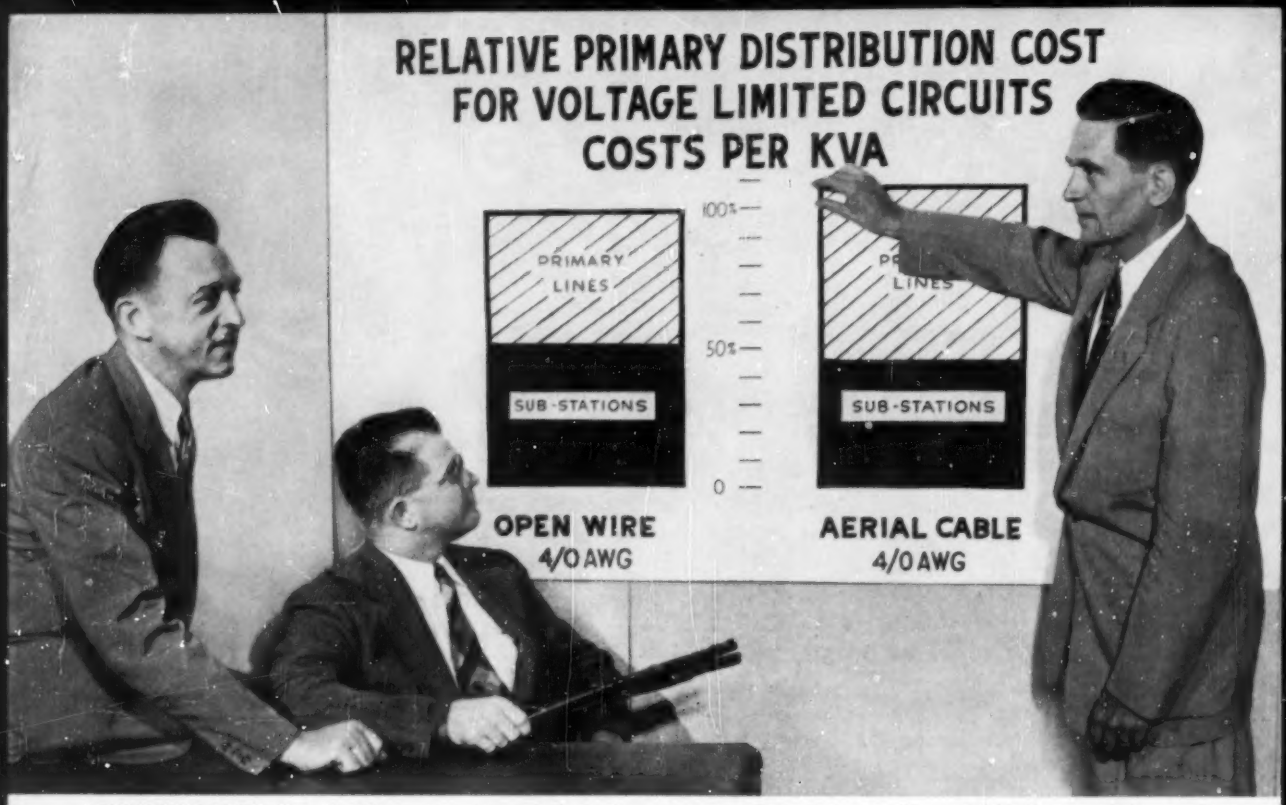
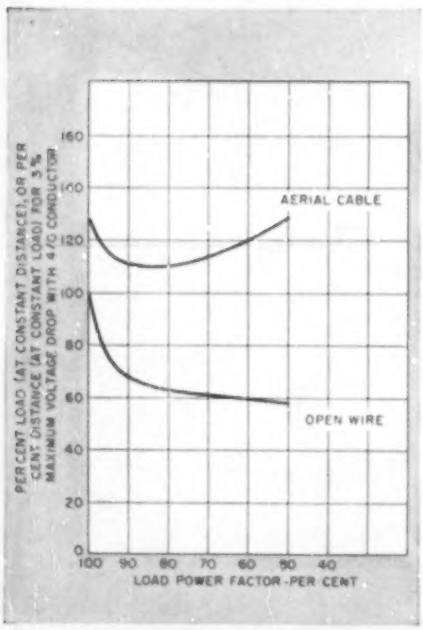


COMPARATIVE COSTS of aerial cable vs. open-wire on the basis of cost per kva of load area coverage are discussed by F. C. Van Wormer (left), electric utility engineer, and Wire and Cable Department's Manager Electric Utility Sales, W.G. Short and commercial engineer A. R. Lee (right)—all of G.E.

It's time to take a new look at aerial cable



EXTRA LOAD CARRYING ABILITY of aerial cable over that of open-wire circuits is shown in this comparison at 4.16 kv, of 4/0 aerial cable and 4/0 open-wire, over a fixed distance, limited to 3% voltage drop.

New study shows aerial cable only 3 to 12% more than open wire not counting greater reliability and improved appearance

A new evaluation, on the basis of dollars per kva of load area coverage instead of the cost per mile of line, shows aerial cable costs only 3 to 12% more than open wire.

CARRIES EXTRA LOAD

Greater load carrying capacity within allowable voltage drop offsets much of the additional cost of aerial cable when voltage is the limiting factor. The close grouping of conductors in aerial cable results in a major reduction of line impedance and consequently voltage drop. This saving, plus the heavier substation loading possible, offsets the major portion of the extra cost per foot of preassembled aerial cable, with a resulting cost only 3 to 12% greater than open-wire.

GREATER RELIABILITY

Additional savings not considered in this analysis also can be credited to the aerial cable installation when the reduced tree trimming, maintenance and outage revenue losses are capitalized. Aerial cable distribution is less vulnerable to damage by the elements than open-wire, and also provides a neater appearance—often important from a customer relations standpoint.

Working closely with electric utilities, General Electric has helped develop new types of aerial cable including preassembled construction and improved butyl insulation as used in Super Coronol* cables.

In this economic evaluation of the use of aerial cable on a systems basis, G.E. continues to assist the industry in finding new solutions to distribution problems.

Further information is contained in "The Economic Performance of Aerial Cable for Distribution Systems," which may be obtained by writing General Electric Company, Section 301-261, Schenectady 5, N.Y.

*Reg. Trade-mark General Electric Co.

MORE POWER TO AMERICA

GENERAL ELECTRIC

Electrical World

Vol 143 No 1 January 3, 1955

DEAR READER,

With this issue Electrical World introduces a number of changes aimed at helping you get the news and data you need in less time and with less effort.

Our service to you goes beyond gathering and publishing the important news of the industry. It includes an interpretive presentation of this information in convenient, easy-to-read form adapted to your busy schedule.

Beginning with this issue, you'll see a new and expanded Electrical Week section where the last-minute industry news and statistics are displayed for at-a-glance reading. Note also the short feature on industry personalities added to this section.

EW's dependable service departments, packed with facts and redesigned for eye appeal, are grouped near the back of the book for your convenience. There in addition to the Manufacturers & Markets, Sales & Service, and News About People departments, you'll find full pages devoted to industry statistics, finance and regulation, EW columns, and Electrical Business Outlook.

In this and future issues you'll see more color on the editorial pages where color makes for readability and understanding of the articles. In addition, to afford more extensive coverage of industry activities, EW will add more news pages in the year ahead.

Electrical World wishes you easier, more informative reading in '55.

Fischer Black

EDITOR

Published for 80 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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ELECTRICAL WORLD

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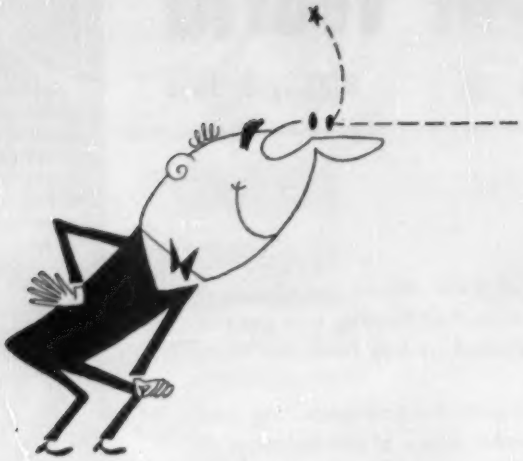

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Is Today's Distribution Obsolete?

Are the utilities expanding systems with obsolete design? Is the rapid trend to 12.5 and 13.2 kv in fast-growing areas proof that remaining 2.3 and 4-kv systems should be ripped out? Is the destruction of lines and service outages caused by sleet and hurricanes proof of poor planning and design?

Certainly design practice that plans new distribution today exactly as it was built 20 years ago should be branded obsolete. But the existing system cannot properly be condemned as obsolete unless it can be replaced or revamped to serve its customers better and/or cheaper.

A substantial amount of modernization is justified, such as converting 2.4 to 4 kv, because important benefits accrue from reasonable expenditures. More elaborate changes, like converting from 4 to 12.5 kv, prove attractive where load growth is rapid and changeover easily accomplished. System economics has been and must remain the controlling factor in changes like these. When service reliability is at stake, costs may not be the controlling factor.

The rapid gain in electrical consumption is certainly making portions of every distribution system obsolete. Many homes are wired for 14 kva demand, and "adequate wiring" calls for 24 kva. Service drops to these homes is No. 6 copper or equivalent for 62% of utilities participating in EW's survey of Trends in Distribution (May 17, 1954, p 133 and Aug 23, 1954, p 103). No. 6 is scanty enough to carry 100 amp, but 13% use No. 8. Here, then, is a place where obsolescence would seem to be upon us.

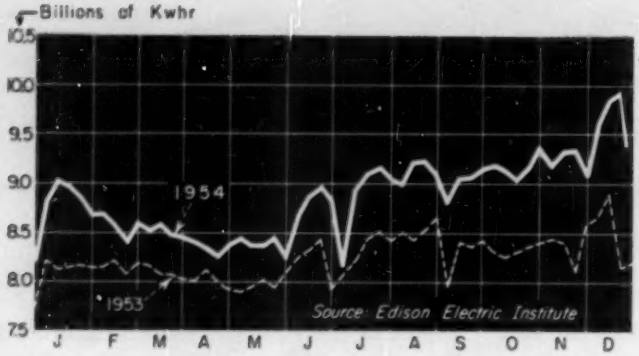
Metering practices today appear better matched to future needs of residential customers than the service drops which feed them. But many meters still in service date back to 30-amp main switches and 2-wire services. Many of these can properly be branded obsolete.

Obsolescence casts its shadow also on hundreds of thousands of small distribution transformers and many miles of No. 4 or smaller secondaries. And its shadow doubtlessly falls to a lesser degree on primaries, substations, and even sub-transmission. The use of open wire is subject to question in certain places, and of overhead plant in any form in others.

Obsolescence seems destined to share with adequacy the closest attention of forward-looking distribution and meter engineers across the country. And EW will join them in providing information and seeking out desirable solutions in a forthcoming feature.

THE ELECTRICAL WEEK

LAST MINUTE



Week Ended Dec. 25

9,400,000,000 Kwhr

Per Cent Change from Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Dec. 25			Not available							
Dec. 18	+11.4	+6.0	+5.1	+8.7	+4.3	+19.9	+11.4	+12.2	+11.6	+7.5
Dec. 11	+13.7	+10.1	+7.8	+10.5	+5.0	+26.2	+12.5	+8.9	+8.8	+9.0

Seasonally Adjusted Index† —177.1 Week Ago 179.0 Year Ago 158.8

The Issue's News Highlights . . . Power issues will play an important part in the deliberations of 84th Congress . . . Northwest utilities do not expect any radical change in use of electric power as result of recent natural gas agreements in the area . . . Utility officials from Northwest report progress in lining up loan commitments for financing of John Day project . . . Briefs will be filed Jan. 11 on Mississippi Valley Generating Co's application to SEC for approval of financing plan.

Walker L. Cisler, president, Atomic Industrial Forum and Detroit Edison, says "1955 will witness the first evidence of industry participation in nuclear reactor field as an owner and risk-taker." Forum estimates that industry or universities will complete plans or begin actual construction of at least a dozen research reactors in 1955. Meanwhile, Central Hudson G&E has joined Atomic Power Development Associates, a nuclear power study group, and Monsanto Chemical, formerly associated with Union Electric study group, has joined Yankee Atomic Electric Co.

NAEC issued statement this week on Dixon-Yates contract aimed at clearing up misconceptions and misinformation and answering criticisms. Contending controversy has centered largely on wrong issues, NAEC Pres P. L. Smith says real issue "is simply whether an American company, competent and able to do the job, should have the opportunity to help supply the electric power needed for atomic development."

Highlights from TVA's 1954 annual report: Power generation was up 26% from 1953 to 29.9 billion kwhr of which 17.1 billion kwhr was steam; steam generation represented 74% increase from 1953; kwhr sales increased overall 26.9% from previous year, but use by federal agencies, mainly AEC, was up 69.4%; these "defense loads" totaled 11.8 billion kwhr and will grow to about 30 billion kwhr within next two years; generating capacity under construction will provide 9.4 million kw by end of 1956, giving only "narrowest of margins;" net revenue from power operations was $28.8 million, equal to 3¼% return on net average power investment of $890 million for fiscal year.

Corps of Engineers sets Feb. 1 for opening bids on six 67,368-kva generators and Feb. 15 for bids on six 100,000-hp hydraulic turbine governors for Chief Joseph Dam. Ultimate installation at dam calls for 27 generators and 1,728,000 kw capacity.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Off the Washington Wire . . . Federal power proponents were busy in Washington last week. Northwest Public Power Association formally proposed to FPC that it declare indefinite moratorium on hydroelectric developments on 64-mile stretch of Snake River between Hells Canyon and Nez Perce dam sites. In same action NPPA filed "informal" protest against application of Pacific Northwest Power Co for preliminary permit to study Mountain Sheep and Pleasant Valley sites on Snake.

In another action federal power groups asked FPC to reject Idaho Power Co's three-dam plan for Hells Canyon . . . FPC observed its 24th anniversary Dec. 22 as an independent agency with five full-time commissioners . . . REA at end of September had approved $34.5 million in loans out of total $135 million authorization for fiscal 1955 . . . Southern California Edison has asked FPC for license to build $2.6 million, 10,000-kw hydroelectric project in Fresno County.

Washington State Power Commission is heading for trouble in 1955 legislature, according to state Democratic Sen Albert D. Rosellini. Act creating commission, he says, "should be revised to provide for proper public power representation on the commission" or commission should be deprived of funds "so as to stop them from carrying on activities . . . in defiance of intent and will of legislature creating them."

Boston Edison and UWUA-CIO have agreed on 4.5% wage increase retroactive to April 4 . . . Boston Museum of Science is planning Theater of Electricity as one of its features . . . Edward H. Steele, retired electrical engineer of NEGEA Service Corp, has been appointed representative of Gilbert Associates to survey possibilities in Caracas, Venezuela, of converting electric utilities from 50 to 60 cycles.

A Minnesota State Legislative research committee has opposed state legislation to provide for state regulation of gas and electric rates "in absence of any concerted demand for state regulation."

U. S. Army awards Italian firm of Industrie Elettriche di Legnano contract to supply three 12,000-16,000 kva three-phase transformers for Cheatham Lock and Dam in Tennessee. Allis-Chalmers Manufacturing was low domestic bidder.

ABOUT PEOPLE IN THE INDUSTRY

Federal government "has dissipated almost 400,000 kw of capacity by its improvident sale" of power, says Frank M. Wilkes, chairman, Southwestern G&E. By refusing to follow advice of electric industry and Army engineers to market power for peaking purposes only, SPA has exhausted water levels of its dams, he notes.

A "critical shortage of power" in New York State, is latest communique from Robert Moses, chairman, New York State Power Authority, in his fight with private utilities to undertake redevelopment of Niagara Falls. In his report on plans for Niagara (although Congress still has to pass on the issue) he promises to fight "grab" by electric companies through "every court."

More News About People page 44

Power Will Be Key Topic When the

Democrats are expected to talk up power issue making frequent attacks on Eisenhower policy as 'giveaway' program. Investigation of utility holding company legislation is likely

The Democratic 84th Congress will pay a lot of attention to the power field. Congressmen will begin dropping power proposals into the legislative hopper on the opening day—Jan. 5—and from there on out these are sure to remain a major concern of the session.

Many proposals will be controversial and will produce more legislative talk than law, but even so there is a good chance that a lot more power legislation will be enacted under the 84th Congress than the 83rd.

Power, taxes, and farm policy are about the only major issues left that set off sparks when the Democratic position is rubbed against Eisenhower policy. The Democrats, smarting under the fact that the Administration has moved into what it considered its preserve on foreign policy and social-welfare legislation, will exploit the public-versus-private power controversy for every last political kilowatt.

'Giveaway' Talk

So public-power-minded Democrats like Sen Estes Kefauver, Sen Hubert Humphrey, Sen Mike Monroney, and Rep Emanuel Celler will do a lot of talking about power giveaways and growing influence of the utility companies under the GOP Administration—all this in conflict with the public interest. They don't expect to see their controversial positions enacted into law, but they see an opportunity to sharpen up a major issue for 1956.

That means that the legislative chambers will reverberate often with talk of Dixon-Yates, TVA policy, and a high dam at the controversial Hells Canyon site on the Snake River.

These controversial issues will provide a springboard for a noisy Democratic investigation of utility holding company legislation. Many liberal Democrats would like to get their teeth into this one but the best chances appear to lie with Presidential-aspirant Kefauver from Tennessee. He would use the Senate Judiciary Anti-Monopoly subcommittee, picking up from retiring Chairman Sen William Langer of North Dakota, who spent much of the past session digging into the Dixon-Yates contract, without much enthusiasm from his Republican colleagues. However, with the committee in the hands of the Democrats, the side-show investigation of last session could be whooped up into a main-tent attraction.

Legislative Prospects

There are bright prospects, however, for a fairly sizable chunk of less controversial power legislation, some new and some left kicking around from last session. Democratic chairmen of committees handling such legislation already have made known their intentions of handling these proposals as rapidly as possible.

Rep Clair Engle of California, the new chairman of the House Interior Committee, will give first push to authorization of the $225-million Trinity River project in his own district in northern California. This power-irrigation project was authorized on a finding of feasibility under Democratic Interior Secretary Oscar Chapman. However, since then there has been a drive in Congress to put a monetary ceiling on projects that may be so authorized; so Engle is anxious to get the legislative stamp of approval on this one before seeking funds from the Appropriations Committee to build it. Also, he'd like to tie in with it the $230-million San Luis irrigation project. This project is nearby in the Central Valley and the irrigation needs of San Luis would help justify power expenditures of Trinity project.

If the Trinity project should encounter a legislative snag, Engle may fall back on a one-package reclamation approach being peddled by former Reclamation Commissioner Michael Straus. The idea would be to lump reclamation projects—such as Trinity River, Upper Colorado basin water storage, Fryingpan-Arkansas water diversion, Washita basin—into an omnibus bill to generate maximum support. Such an approach in the House might help get through bills like the $1-billion Upper Colorado project that bogged down last year after a hot committee fight over conservation issues involved in building the Echo Park Dam feature.

It would also help a controversial project like the $172-million Fryingpan-Arkansas proposal that was voted down for floor consideration in closing weeks. Washita basin, that has only regional support in Oklahoma and Texas, would profit from an omnibus approach.

Another argument advanced for the one-package deal is that it would clear the way for the Bureau of Reclamation to do advance planning and preconstruction work for some sound projects that could be built on short notice if the national economy should sag and need stimulation.

But, if an effort were made to include the controversial high dam at Hells Canyon, the entire bill could be stymied.

Senate Attitude

On the Senate side, where reclamation legislation usually has smoother sailing, there is less interest in the single package approach. Sen James Murray of Montana is scheduled to be chairman and he is readying a list of projects to take up, high among them the $100-million Yellowtail project in Montana. The Senate last year passed Fryingpan-Arkansas and reclamation-minded members see no problem getting through bulk of reclamation legislation. However, Sen Wayne Morse, Independent of Oregon, and his new colleague, Sen Richard Neuberger, can be counted on to do a lot of talking in favor of government construction of the high dam at Hells Canyon and will at-

84th Congress Meets

tack Administration power policy.

Another power proposal that will run into conflicting viewpoints is the Niagara River development in upper New York State. The last Congress had several different proposals on Niagara development—federal, state, and private. The House passed legislation authorizing private development, while the Senate Public Works Committee reported out a bill clearing the way for state development. But the Senate failed to act on it.

All these approaches are expected to be included in bills that will be introduced. The big issue this year will again be private-versus-state development, while the Democrats will make an effort to write a public preference clause into any state development legislation that is passed. However, prospects are that if the House acts, it will again pass a private development bill.

SEN ESTES KEFAUVER

SEN HUBERT HUMPHREY

Savannah Project

Hartwell Dam—on Savannah River will be pushed again. The $90-million dam was authorized in 1950, but the Bureau of the Budget has yet to approve money for a start. Southern forces are putting pressure on the Budget Bureau to approve a start and chances are very good that it will. If the recommendation comes to the Hill, Congress is expected to approve enough money for a start. The dam would have a capacity of 40,000 kw.

One controversy sure to come up is on money to operate TVA. When the Appropriations Committee gets around to earmarking money for the controversial operation, attention is certain to be given to suggestions that TVA pay its own way. Possible methods of self-financing already are under study by Chairman Herbert Vogel. There have been suggestions in the past that TVA's power expansion be financed through sale of bonds which would be retired from the system's revenue. There is likely to be less emphasis on such an approach under a Democratic Congress than under a Republican one. But Congress is certain to be influenced by position of President Eisenhower who does not favor appropriations for beginning new TVA power projects.

SEN MIKE MONRONEY

REP EMANUEL CELLER

These four public-power-minded Democrats are expected to play leading roles in attacks on the Eisenhower Administration's power policies.

NW Gas Pacts

Pacific Northwest electric utilities expect to gain from introduction of natural gas

The prospect of ample natural gas supplies flowing into the gas-starved Pacific Northwest in the next few years is in no way dismaying electric utilities. Although gas will compete for markets formerly the province of the electric companies, they welcome the prospects of a plentiful new cheap fuel. The electric companies figure natural gas will bring in many new industries and give the economy of the area a shot in the arm, from all of which benefits will accrue to electric firms as well as gas industry.

The natural gas picture in the region was brightened considerably recently with the completion of an agreement to import gas from Canada. This followed an earlier arrangement to bring in gas from Colorado's San Juan basin.

No Big Change in Power Use Seen . . . "We can't see any radical change in electrical use in the home in view of the past pattern of electrical gains against the very aggressive competition of Portland Gas & Coke Co," said a top Portland General Electric Co executive. "Anyway, the competition will be good. And in addition, there are developments in the field of electric home heating (heat pump) which will favor our service."

Electric companies believe new gas space heating customers will be gained at the expense of oil burners. They figure the limited drop in burner motor loads will be more than made up in summer months when industry motor loads are expected to jump because of new industries attracted by natural gas.

For instance, the chemical industry, traditionally a big consumer of electricity, can be expected to grow on natural gas as a raw material.

Owens-Illinois Glass Corp has had a site for a container plant under lease in Portland for over a year, anticipating the import of gas.

Finally, availability of natural gas might permit fuel cost reduction in steam generating facilities maintained for peaking purposes by electric utilities. At present these facilities are fueled by oil or hogged wood chips.

Niagara Mohawk Accepts GE Painting

Niagara Mohawk Power Corp Pres Earle J. Machold (second from left) recently accepted from General Electric Co an original painting of Niagara Mohawk's Huntley Station Unit No. 65, whose direct-cooled generator field is a design "first." The GE-built 125,000-kva generator shown in the picture was installed in 1953.

Presentation to Machold was made by William J. Woods, (far left) manager of the GE Empire District. Shown at right of painting (left to right) are: C. J. Wick, Niagara Mohawk vice president, Buffalo; D. J. McLaughlin, GE Steam Turbine-Generator Department, Schenectady; and R. A. Osborne, GE Empire District, Syracuse.

NW Utility Heads Confer on John Day Financing

Northwest utility officials, turned down by the Army Corps of Engineers on their offer to advance early planning funds for John Day Dam, are moving to assemble loan commitments to finance partnership participation if Congress provides construction funds.

Offer of Portland General Electric Co, Washington Water Power Co, and Pacific Power & Light Co to advance $350,000 to initiate early planning and designs for the 1.1 million-kw Columbia River project was rejected by the Corps for lack of legal authority.

Corps' Portland District Engineer, Col James U. Moorhead, in a letter to PGE's Pres James H. Polhemus, expressed regret Corps could not accept "your generous offer" and explained John Day was authorized under the Flood Control Bill of 1950 and not the Rivers and Harbors Act of that year. "Authorities applicable to flood control projects would allow acceptance of advance funds only if made by states or political subdivisions or if no return of the funds was desired," Moorhead wrote.

Loan commitments were being sought by the utilities group through PGE Board Chairman Thomas W. Delzell, who was in New York late in December with other utility representatives, including Attorney Raymond Kell who is counsel for mid-Columbia PUD's and REA's, talking with investment houses.

Company sources indicated progress in lining up loan commitments was satisfactory—in fact, pleasing—and there might be an announcement later.

It was explained by one spokesman the utilities group wants to be in a position to say "we are ready" when the new Congress is asked to authorize partnership development of the site. The investor-owned utilities and associates, the latter a group of Columbia Valley PUD's and REA's, had made the offer on the basis of 1925 legislation which the companies' legal staffs say permitted advances and return of planning money if Congress eventually should provide construction funds. The offer had been made Nov. 9 in hopes Corps could start site exploration during the low water months ahead and pick up almost a full year of time in warding off threatening kilowatt deficits forecast for 1960. There were no strings attached to the offer, whether it was built by the government or private utilities or in partnership, and the advance would not have drawn interest.

POWER BRIEFS

● Army Corps of Engineers reports that electric power from Lookout Point Dam's first 40,000-kw generator began flowing into the Northwest Power pool last month. Generation of the unit was built up gradually until it reached 20,000 kw, the maximum at which it will be operated during the 30-day trial period. Unit's production will help bolster power supply in Bonneville Power Administration's southwest Oregon grid.

● Establishment of a new unit to study problems involved in the design of atomic power plants has been announced by Franklin Institute Laboratories for Research and Development, Philadelphia.

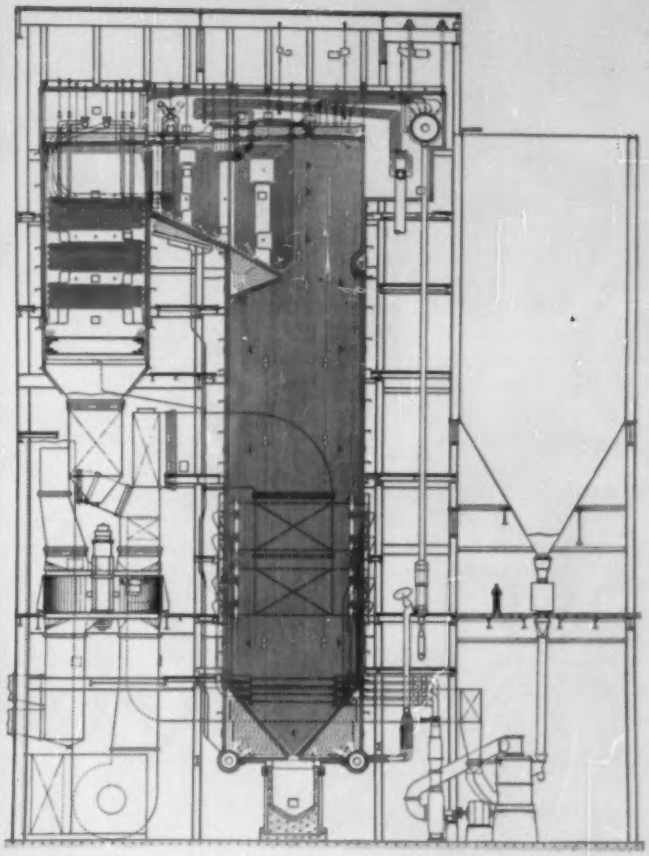
● Public Service Co of New Mexico has completed construction of a $4.7-million addition to Person Station—its main generating plant in Albuquerque, N. M. This boosts the plant's nameplate capacity to 73,000 kw with overload capacity of 87,000 kw. The newest addition — phase three in a $16-million expansion program started three years ago—winds up major construction of generating facilities until 1956.

● Interior Department last month disapproved a 15-year extension of its contract with Citizens Utilities Co, Greenwich, Conn., under which the firm distributed low-cost Hoover Dam power in the Kingman, Ariz., area. Contract expired Dec. 31. Contract renewal was opposed by City of Los Angeles, Southern California Edison Co, and California Electric Power Co, who claimed they were given rights to the power upon expiration of present contract negotiated in 1945.

GALLATIN STEAM PLANT

Tennessee Valley Authority

C-E controlled circulation boilers



The C-E Unit shown above is one of two duplicates now under construction for the Gallatin Steam Plant of the Tennessee Valley Authority at Gallatin, Tennessee.

Each of these units is designed to serve a 250,000-kw turbine-generator operating at a throttle pressure of 2000 psi with a primary steam temperature of 1053 F, reheated to 1053 F.

They are of the controlled-circulation, radiant type with a separated furnace arrangement. Secondary superheater surface is at the outlet of one furnace and reheater surface at the outlet of the other. Primary superheater sections and economizer surface follow both the secondary superheater and reheater surfaces. Regenerative air heaters follow the economizer surfaces. The section shown above is taken through the superheater furnace.

Pulverized coal firing is employed, using bowl mills and tilting, tangential burners. Natural gas may be used as an alternate fuel.

B-805

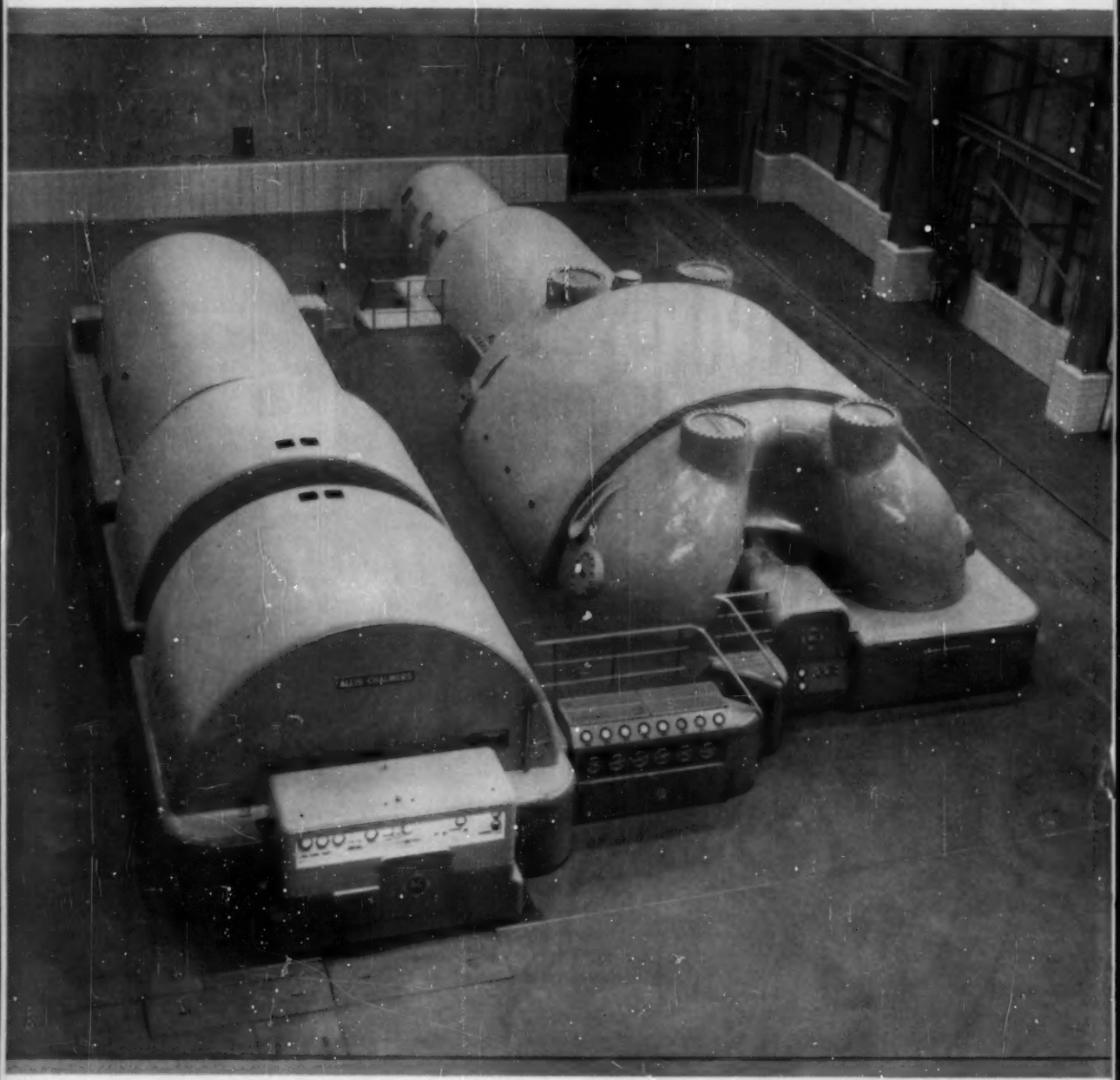
C-E

COMBUSTION ENGINEERING, INC.

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS & FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

NEW Milestone in



ALLIS-

Steam Turbines

World's first close-coupled, cross-compound reheat turbine completes first year of operation, sets pattern for future power generation.

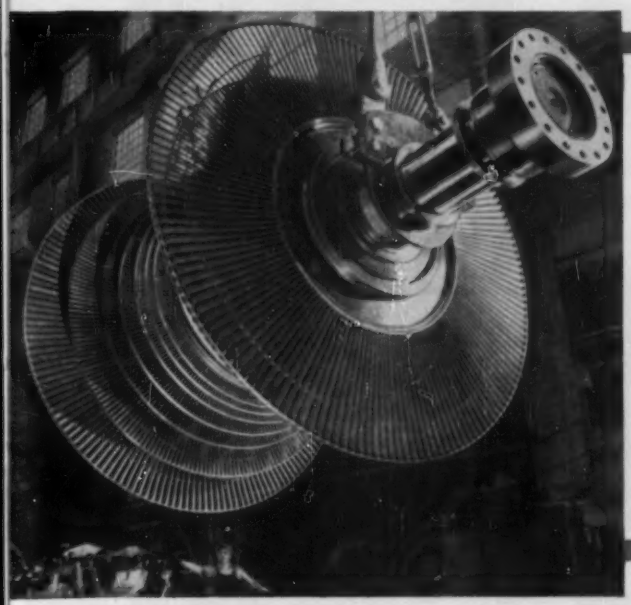
WISCONSIN ELECTRIC POWER COMPANY'S first unit at its new Oak Creek Station has proven design features that open new possibilities for steam turbine development. One additional Allis-Chalmers unit of the same type is being installed, another is under construction.

Close-coupled design makes a compact unit possible. It can be installed transversely or longitudinally in the turbine room with minimum crane span and still stay within space limitations of the boiler. End result is a smaller building with smaller turbine foundation. The entire unit rests on a single foundation. With the shafts so close together, oil piping can be reduced to a single feed and single drain line for both high and low speed machines. Steam piping is short and direct. A short "cross-under" carries steam from the intermediate pressure turbine to the center of the double-flow, low pressure 1800-rpm turbine.

Both high and intermediate pressure turbines operate at 3600 rpm, keeping the high temperature turbines favorably small in physical size. Primary steam to the high pressure turbine is at 1000 F, and reheat steam to the intermediate pressure turbine is also at 1000 F. The 120,000-kw unit generates two-thirds power at 3600 rpm and one-third at 1800 rpm.

You can depend on Allis-Chalmers for pace-setting turbine-generator units engineered to meet your requirements... in ratings up to 500,000 kw. For information, contact your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wis.

A-4451



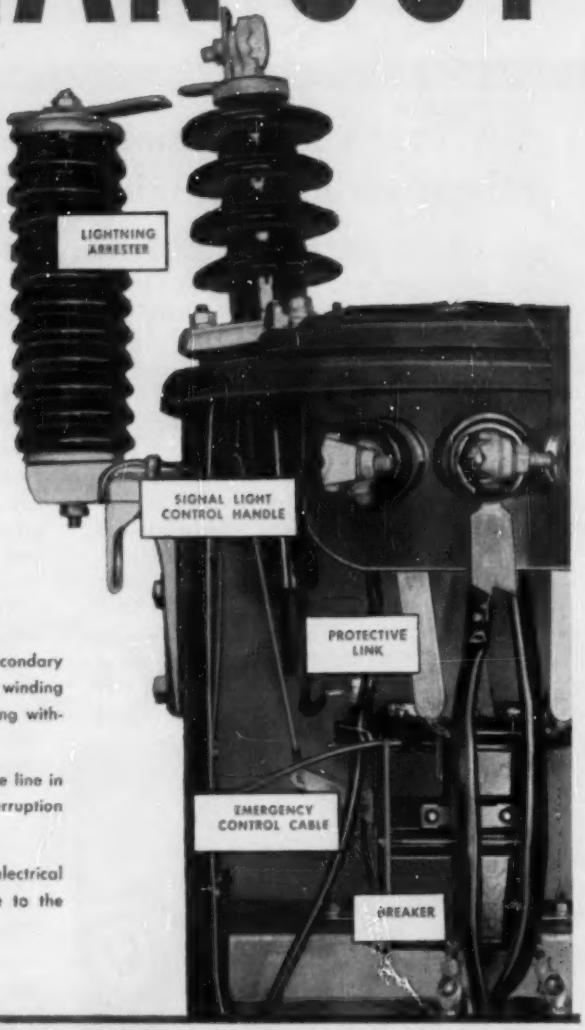
Longest Exhaust Blades

This cross-compound 3600/1800-rpm reheat turbine provides the large exhaust area needed for superior performance of high capability turbines. Its low pressure turbine operates with 40-inch blades, longer than any previously used. It operates at unusually low ½-inch exhaust pressure. The same low pressure turbine could be used at 1-inch exhaust pressure on a 250-mw unit. In addition, units of this type can be built in sizes up to 500 mw.

CHALMERS

A-C ALLIS-CHALMERS

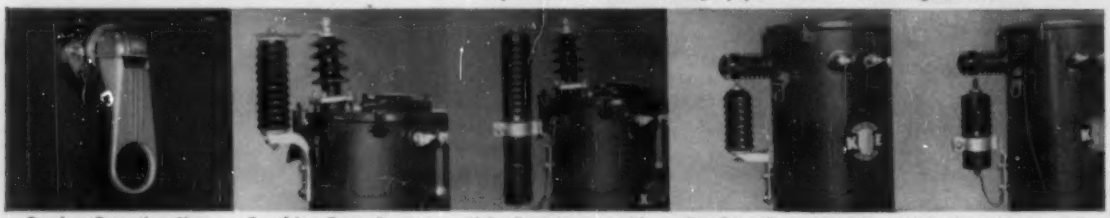
KUHLMAN CSP



Four-way protection gives better service, longer life at lower cost

1. **Protects customer service** by signaling a warning in growing load areas before overloading occurs and providing for emergency overloads.
2. **Protects transformer life** by providing a secondary breaker that operates within the safe limits of the winding temperature and protects against unsafe overloading without sacrificing short-time overload capacity.
3. **Protects the line** by clearing transformer from the line in case of internal failure and preventing service interruption to the remaining transformers on the line.
4. **Protects against lightning** by safely bypassing electrical surges without interruption of service or damage to the transformer.

Optional Arrester and Bushing Equipment for Various Voltage Classes



Breaker Operating Handle with Warning Light and Emergency Control Lever.

Expulsion Type Arrester with Isolating Gap.

Valve Type Arrester with Isolating Gap.

Expulsion Type Arrester with Isolating Gap.

Valve Type Arrester with Isolating Gap.

Voltages above 5,000 Volts Mountings Are Interchangeable. Voltages Below 5,000 Volts Mountings Are Interchangeable

165

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

Briefs on MVGC Are Due Jan. 11

Following submission of statements to SEC, Dixon-Yates group, opponents will be permitted to file rebuttals Jan. 18

With conclusion of public hearings late last month, the next step in the Dixon-Yates group's fight for Securities and Exchange Commission approval of financing for its new West Memphis, Ark., steam plant, will be the filing of its legal briefs on Jan. 11.

When Mississippi Valley Generating Co and its public power opponents have filed these briefs, each will be permitted to file rebuttal briefs on Jan. 18, and oral argument will begin the next day. When this schedule has been completed, the commission will make its decision on MVGC's application for approval of issuance of 55,000 shares of $100 par value common stock to the sponsoring holding companies, Middle South Utilities, Inc, and the Southern Co.

Hearings End . . . SEC ended several weeks of hearings just before Christmas, apparently in an effort to complete the filing of briefs and wind-up arguments in time to make a final ruling before Feb. 15. Under the Dixon-Yates contract with the Atomic Energy Commission, either side may withdraw without penalty if SEC has not ruled on the stock application by that date.

Setbacks for Volpe . . . During the last few days of hearings, Attorney Joseph Volpe, counsel for the public power intervenors in the proceedings, suffered numerous setbacks as he examined witnesses. One of these concerned documents reporting on the progress being made by MVGC in obtaining $100 million in loans from banks and insurance companies to complete financing of the new steam plant. SEC denied Volpe's request to subpoena the records in view of the fact negotiations are still going on.

Another was his attempt to introduce into the record a memorandum prepared in his office on Dec. 19 by Dr Frederick Kellogg of the University of Mississippi. That memo outlined a telephone conversation with University Provost Bryant concerning an anonymous telephone call hinting that Dr Kellogg should not testify as an expert in the proceedings conducted by the SEC.

Dr Kellogg did testify from memory on the circumstances surrounding the telephone call, and he told the commission his testimony had not been influenced by any threat. Middle South Counsel Daniel James made it clear there was no connection between any threat to Kellogg and the MVGC applicants, and he declared for their side that any such action as might have occurred was completely unauthorized.

In his technical testimony, Kellogg said the new plant's foundation, in view of its proximity to the Mississippi River, would require piles 30 to 60 ft below the ground surface, and that "high caliber" engineering supervision would be needed for the Arkansas project.

Meanwhile, two public power senators tried to keep the pot boiling with public statements questioning the advisability of the contract. Sen Estes Kefauver (D-Tenn.) appeared on a week-end television program, stating once again his belief that the contract is an attempt on TVA's life, and Sen Joseph O'Mahoney (D-Wyo.) sent a letter to SEC Chairman Ralph Demmler declaring that the contract opens the "road back to monopoly." He asked that SEC give careful consideration to the source of the Dixon-Yates' equity capital and the affiliations of the officers of the new power company.

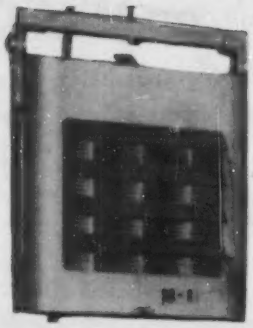
Holiday Lighting Down on the Farm

The Kozier "all-electric" farm in Bernville, Pa., went all out this year to light up for the holidays. Owner William Kozier began the job of stringing lights on Labor Day. He turned the display on for Thanksgiving, but has been adding to the decorations since that time.

The display consists of 7,122 individual colored lamps connected by 28,750 ft of wire. Four 220-v lines feed one 100-amp and three 60-amp distribution panels. The lines in turn are fed from a transformer on a center pole which Metropolitan Edison Co feeds over a 4,800-v line. The connected load for Christmas lighting alone is 50 kw.

Better heating, production

space gained as . . .



HEATER at upper left (left photo) is one of six 10-kw units with its own thermostat in the plant area. As heat is cut back to 55 F after employees leave the building, the booster units in the center of the plant (right photo) are required for heat recovery to 76 F by 7 A. M.

First Electrically Heated Ohio Plant

An electric heating system has given the Melin Tool Co, Cleveland, a more efficient heating system, more production space, and a cleaner plant than the stoker-type furnace it replaced, all at reduced cost, according to P. H. Hartshorn, company president.

In February, 1953, when he decided to install electric heating, not a single industrial plant in the state was using electricity as its sole heat source. Plants in the South had such installations, but there were less than a dozen north of the Mason-Dixon Line.

But Hartshorn was prompted by his own observation that the old, bulky heating system could not eliminate "cold spots" throughout the building and that winter production of the expendable metal cutting tools which the company makes for use in milling machines was impaired.

After the first year of operation, the electric heating system, he found, was $282 cheaper than the stoker-type furnace, and the second year's costs were 26% lower.

Installation in Plant . . . The installation, based on a rule-of-thumb of 1 w per cu ft, consists of six 10-kw electric space heaters, each with its own thermostat. Each corner of the factory area has one heater, and two units have been hung near windows at points half the length of the work area. This positioning at approximately 30-ft intervals on the perimeter of the manufacturing area was designed to equalize heat concentration from wall to wall. Smaller units have been placed where needed. In office areas heat is supplied by both wall-mounted and portable units, most of them 3-w. The initial heating installation totalled 92 kw.

This installation was to provide heat for the 6,267-ft plant. Metal casement windows run the length of the shop, starting 5 ft from the floor and extending to the 15-ft ceiling. There are approximately 1,500 sq ft of glass in the plant, a factor inimical to any heating system. Even the non-glass area offers difficulties to a heating system. Most of the plant is cement block coated with thoroseal. The 50-ft brick front is backed with cement block. The floor is cement slab; ceiling reinforced cement.

Other Provisions . . . The new equipment had its "breaking-in" period during the heating season of 1952-53. That winter proved that the large expanse of glass was cutting deeply into the heat output of the new system. During the summer of 1953, the factory area's ceiling and about a third of the window area were covered with a ¾-in. blanket of rock wool. This was the only insulation used.

Cuts Costs 26%

Operating Cost Drops 26% in a Year

	1952-3	1953-4
Operating cost	$3,359	$2,480
Degree-days*	5,454	5,354
Heating cost, degree day	0.62	0.46

*Degree-days is the standard for measuring severity of weather. Number of degree-days is determined by subtracting mean temperature for a day from 65F. A day with mean temperature of 40F would represent 25 degree-days.

Soon after the system went into operation, it appeared evident that booster heaters were needed to warm the plant before employees arrived. Thermostats on the six perimeter units were set back to 55 F when workers left the plant at 4 P. M. To bring plant temperature up 20F in several hours, two 15-kw heaters were installed in the center of the plant. A time clock turns them on at 5 and shuts them off at 7 A. M. They are seldom used during the day.

When the boosters cut out soon after the workers' arrival, small heaters operate at staggered intervals to keep the plant warm all day. Usual daytime plant temperature is about 70F. The electric heating system offers complete flexibility which is important, according to Hartshorn, because 75% of the workers are women engaged in the precision work of machining small parts. Temperature checks throughout the work area have showed only one or two degrees variation, and no drafts have been noted.

An important factor in the decision to install electric heating was the prospect of obtaining more productive plant space. By hanging compact electric heaters on the ceiling, the old heating system could be removed and 8,700 cu ft of space be released. The new installation has simplified housekeeping, as there are no combustion products with electric heat, no ducts to clean, no furnace to maintain, and no stoker to fire.

Many heat sources at various points produce faster heat recovery than a single source at the back of the plant; and as each unit has its own thermostat, areas can be zone heated to individual requirements.

Costs Compared . . . As Melin Tool is pioneering with electric plant heating in its area, it has kept close cost figures on the system's operation.

Original equipment cost for the fuel-type system was $4,800, and the life of such a system was estimated at ten years, implying an annual amortization cost of $480. Fuel costs for the old system during its last year, 1951-52, were $1,800. The cost of operating the blower motor was $100. Maintenance costs totaled $1,000, including outlays for replacement parts and labor to fire the stoker, remove the ash, and clean up over weekends. As the installation of equipment requires capital, there is an interest rate of 6% applied to the original $4,800. This amounts to $288.

Any realistic analysis must include the cost of the 8,700 cu ft of space occupied by the old system. At $1 per cu ft and estimated on a 20-year basis, this use-of-space was costing $435 per year. Thus total annual cost for the stoker-type system was $4,003.

The electric heating units cost $4,200 installed and has an estimated life of 20 years, or $210 per year. During 1952-53, the operating cost was $3,359. The interest on the original investment of $4,200 came to $252 annually.

Total annual cost of the electrical heating system was $3,821. Melin Tool pays an average incremental electric rate of 1.8¢ per kwhr.

For the first four months of the system's second year of operation, heating costs were 40% below those of the same months of the preceding year. As the number of degree-days in each period was approximately the same, the insulation of the ceiling and glass area was a factor.

This article is based on material in a recent issue of "Electrical Production," published by the Electrical League of Cleveland.

NENYIAC Hearings

New England committee schedules more public meetings on water resources report

Further public hearings on the New England-New York Inter-Agency Committee on the river basin hydroelectric and other resources of the seven northeastern states have been scheduled. Assigned dates are: Jan. 12, Montpelier, Vt.; Jan. 13, Concord, N. H.; Feb. 8, Albany, N. Y.; Feb. 9, Syracuse, N. Y.; and Feb. 10, Buffalo, N. Y.

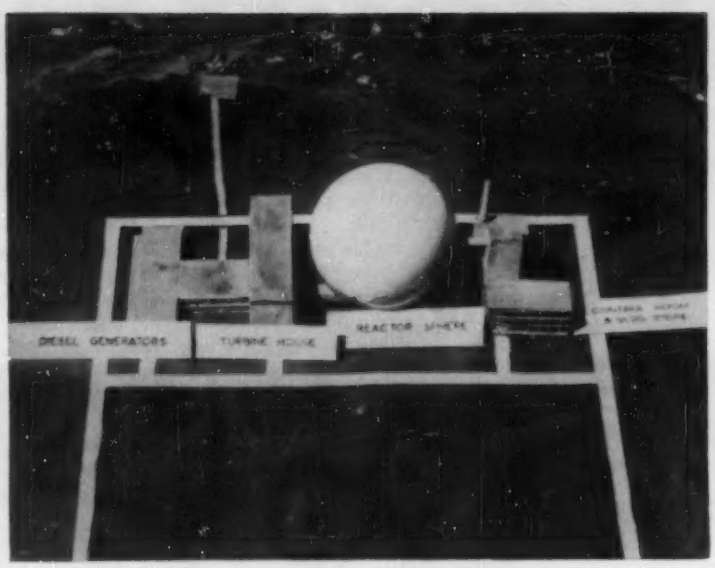
Information on the locations and exact times of the hearings can be obtained through James R. Johnston, executive secretary of NENYIAC at Room 1107, 150 Causeway St., Boston 14, Mass. The agency's executive secretary can also be consulted on when and where available drafts of the committee's reports can be consulted.

Understanding Promoted . . . December hearings of the committee, at Springfield, Mass., New Haven, Conn., and Providence, R. I., under chairman Col B. B. Talley, revealed progress in bringing forth popular understanding of the objectives of the resources survey made during a four-year period.

Committee Lauded for Realism . . . At the New Haven hearing, Robert P. Stacy, administrative vice president of Connecticut Light & Power Co, pointed out that NENYIAC's inventory of undeveloped water power projects economically feasible in New England totals only 287,900 kw, against a total potential underdeveloped capacity of about 1.6 million kw. He congratulated NENYIAC upon its realism and stated that within his experience this is the first time a governmental committee has produced a report on water power on the same realistic basis as private utility estimates.

Stacy observed further that the committee, after long study, found that in Connecticut there is no economically feasible undeveloped water power site on the Housatonic River other than the Shepaug project now under construction by Connecticut L&P. Possibilities of a development at Enfield on the Connecticut River are being checked by the Windsor Locks Canal Co, a Connecticut L&P subsidiary, whose cost estimates are now being examined against actual costs on the Shepaug job.

Stacy also noted that present day costs are about 25% higher than in 1949, the necessary basis of NENYIAC's data at the survey's beginning. He remarked that the rapid progress which is being made in the field of atomic energy could result in making this new source of power more attractive economically than any of the undeveloped water power sites in New England. The possibility should not be ignored in any long range study of this area's future power supply, he said.



Britain Plans 2nd Atomic Power Plant

Britain's second atomic power station soon will be built at Dounreay in northern Scotland. Dominant feature of the plant is the steel reactor sphere, which is 150 ft in diameter and 35 ft above ground level, which is shown in scale model above. The new station, which will house a "breeder reactor," will be Britain's ninth atomic energy center.

Index Is Available

Electrical World's semi-annual index for July-December 1954 has been prepared, and copies are now available upon request. They may be obtained without charge. Address requests to Electrical World, Editorial Office, 330 W. 42nd St., New York 36, N. Y.

Chain Curtains Used to Divert Young Salmon

Lives of millions of young salmon may be spared by installation of newly developed chain curtains in waters at Vancouver, B. C.

Curtains are part of a series of experiments carried out last summer by British Columbia fishery engineers, working to find some means of diverting downstream salmon migrants from dangerous areas such as hydroelectric units.

Dr J. R. Brett, Pacific Biological Station, in charge of experiments, said most successful of several techniques tested was the hanging chain system.

Under this system, series of chains suspended from an aluminum rod are hung in water and young salmon approaching the chain curtain are forced to move aside and enter a diversion pen.

A STATION ENGINEER ASKS—

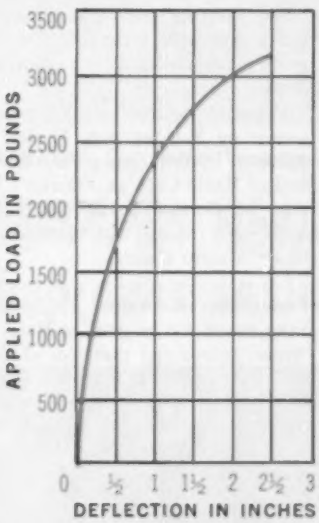
"Why is it necessary to shim 69 K.V. switch units ?"

Here's the ANSWER: *You don't have to when you use Pinco L-6069 Switch and Bus Units.*

Here's WHY:

The Pinco L-6069 Switch and Bus Unit employs a ribbed malleable iron pin to give it the rigidity and strength required in this unit's application.

Here's the PROOF: The deflection curve below shows the rigidity of the Pinco L-6069 Switch and Bus Unit under various loads. The secret of Pinco's perfect alignment even when horizontally mounted, lies in the balanced design of the porcelain and hardware.



SPECIFICATIONS

PINCO L-6069
SWITCH and BUS UNIT

Cantilever Strength, upright (Base mounted)	1500 lbs.
Cantilever Strength, underhung (Cap mounted)	1000 lbs.
Torsion Strength	15,000 inch lbs.
Tension Strength	12,000 lbs.

This Unit More Than Meets The Above Ratings

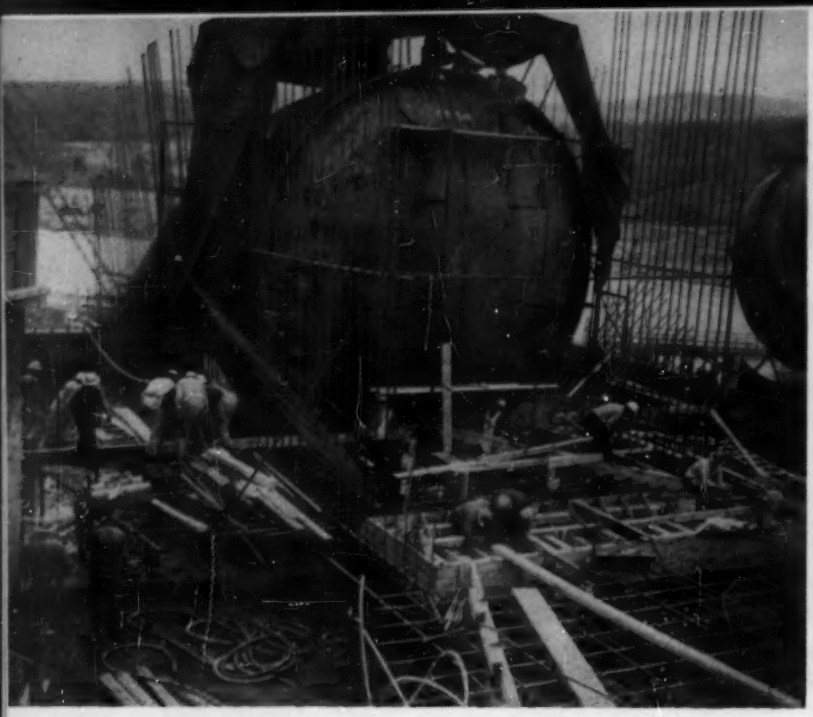
SEE PAGE 116, PINCO CATALOG NO. 49 FOR COMPLETE ELECTRICAL AND MECHANICAL CHARACTERISTICS

PINCO INSULATORS

RIGHT ON THE JOB!

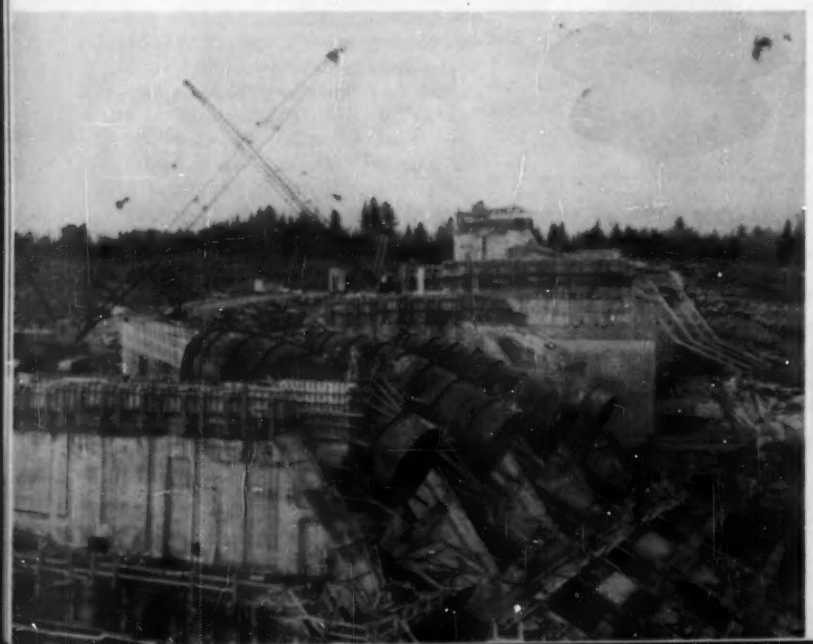
The Porcelain Insulator Corporation
766 Main St., Lima, N. Y.

If you don't have a copy of the Pinco Catalog, write us, or contact the Joslyn Mfg. & Supply Co. office in your locality.



New Project on Upper Connecticut River

Penstocks are being erected for latest hydroelectric station of New England Electric System. The station, located on the upper Connecticut River near Littleton, N. H., will add 150,000 kw in generating capacity to NEES. In 1956, the development will complete a program for the full utilization of the Fifteen Mile Falls stretch of the river. The new $45-million plant will be dedicated in honor of the late Samuel C. Moore, one of the system's founders. It is practically the twin in design and capacity to the Comerford station a few miles downstream.



AIEE Parley

Large technical program to highlight institute's winter meeting set for Jan. 31-Feb. 4

One of the largest technical programs in the history of the American Institute of Electrical Engineers will be offered at its Winter General Meeting slated to be held in New York Jan. 31-Feb. 4.

Technical agenda calls for about 85 sessions on such topics as switchgear, transformers, heat pump, insulated conductors, power generation, and transmission and distribution.

Delegates will also discuss these subjects: Cathodic protection, thermal aging of insulation, prevention of fires from electrical causes, liquid and gaseous dielectrics, computing devices, system engineering, and synchronous machines.

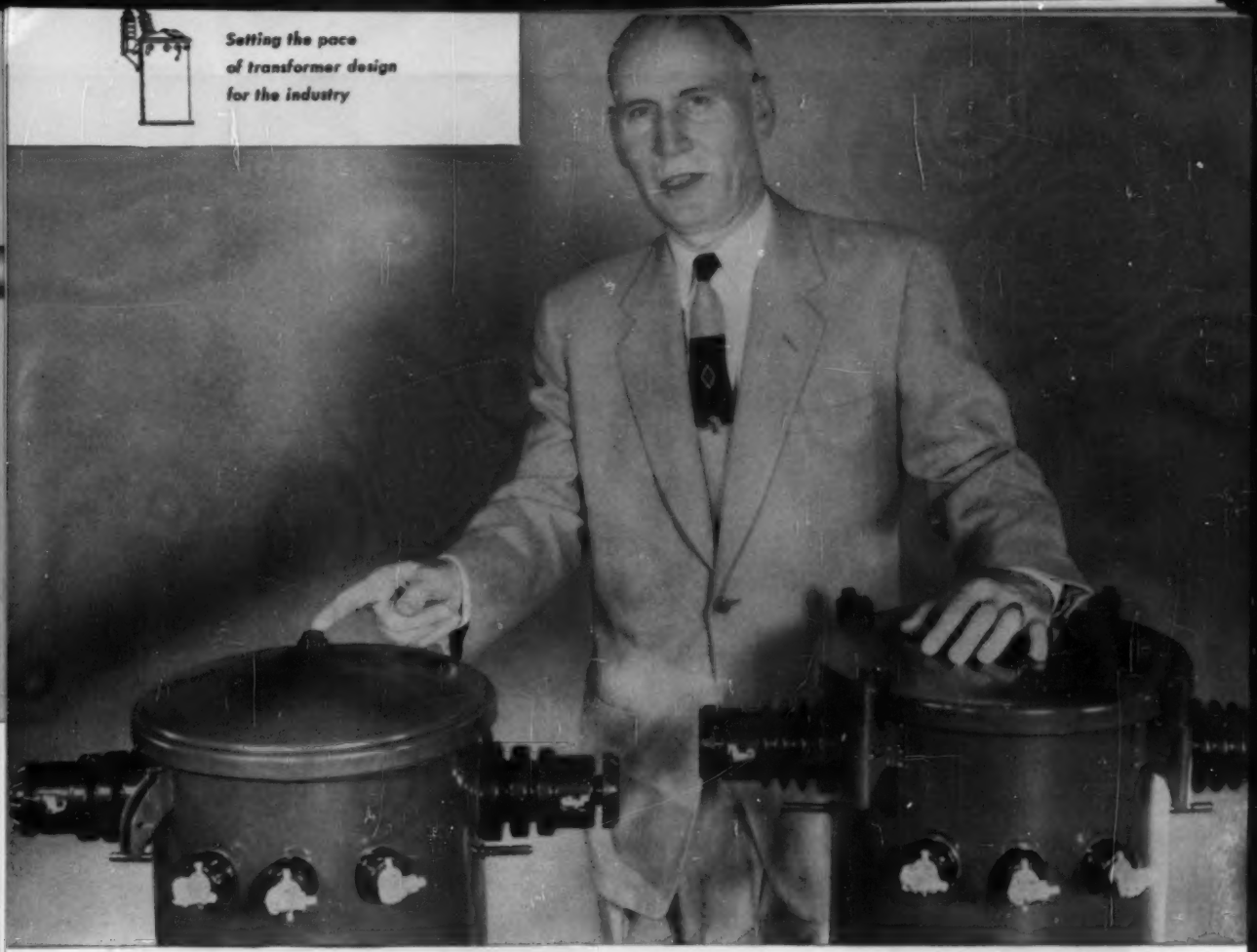
Maintenance Discussion Will Be Held . . . Maintenance of turbine-generators will be analyzed at a synchronous machines session. L. O. Dorfman of Ebasco Services, Inc, who is chairman of the Rotating Machinery Committee, hopes that the talks and papers at the session will bring forth a new guide for maintenance of turbine-generators.

Principal address at the general session on Monday, Jan. 31, will be delivered by Brig General David Sarnoff of Radio Corp of America. Just prior to General Sarnoff's talk, the John Scott Medal will be presented to Dr Marvin Camras.

Presentation of Awards . . . The John Fritz Medal will be given to Harry A. Winne, retired vice president of General Electric Co, at a special session on Tuesday, Feb. 1. On Wednesday, the Edison Medal will be presented to Dr Oliver E. Buckley, retired president of Bell Telephone Laboratories, Inc.

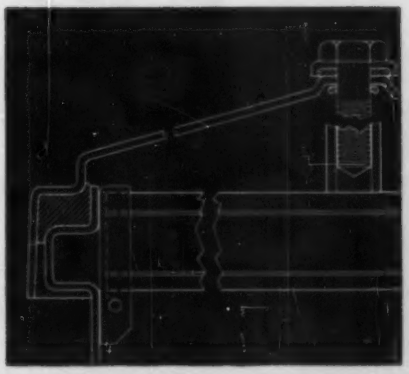
Among the inspection trips planned by AIEE are visits to these locations: New York Stock Exchange, Astoria Station of Consolidated Edison Co of New York, Inc, International Business Machines Corp, United Nations, Federal Pacific Electric Co in Newark, N. J., Sylvania Research Laboratories, Bayside, N. Y., Brookhaven National Laboratory, Upton, N. Y., and Westinghouse's Television Center in Metuchen, N. J.

Setting the pace of transformer design for the industry



Bob Rung, Distribution Equipment Sales Manager, points out this

FACT: New dome cover combats corrosion, improves sealing, simplifies operation



DOME COVER DESIGN DETAILS

Corrosion licked! Cover hardware eliminated—all threads and clamping members mounted internally, protected from damage and moisture. *Sealing assured!* Gasket is completely confined and held under constant, uniform pressure by spring follow-action of main cover. *Operation simplified!* Single captive bolt provides easier, faster cover removal, as well as exact reassembly.

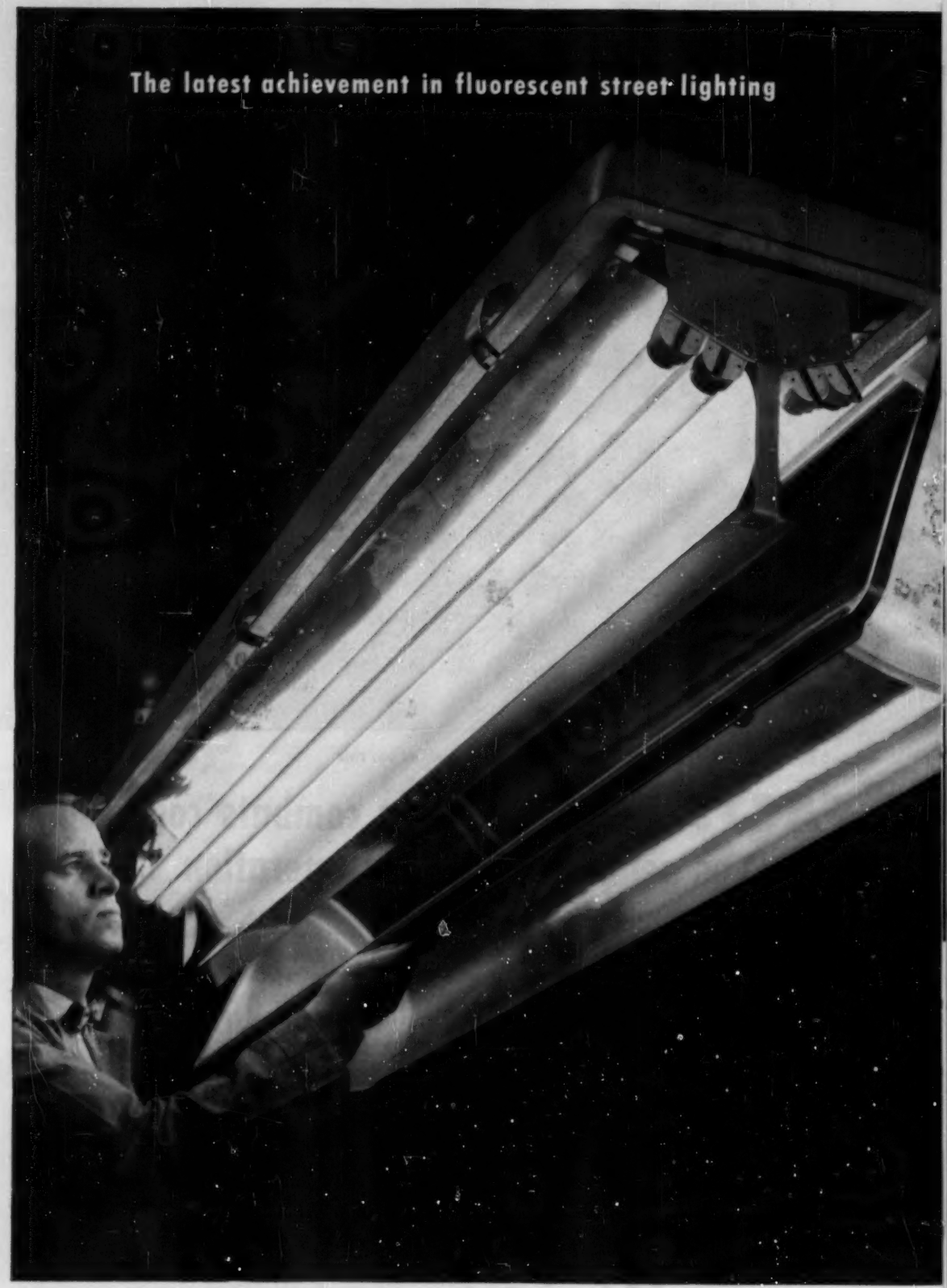
The exclusive dome cover is just one of the many design advances of the new Westinghouse line that add up to more for your transformer dollar.

• • •

Get all the facts today from The Man With The Facts, your Westinghouse Sales Engineer. Or write direct to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70736

YOU CAN BE SURE...IF IT'S

Westinghouse


The latest achievement in fluorescent street lighting

FACTS about the new Westinghouse fluorescent street lighting luminaire

FACT: Top efficiency—The new 4-FSL-72 fluorescent luminaire has a large one-piece reflector and offset lamp arrangement. No physical obstructions interfere with light distribution.

FACT: Day and night eye appeal—The smooth fiber glass hood and clear plastic cover blend to produce a clean silhouette by day and a comfortable light source at night.

FACT: Easily maintained—Cover opens from either side by releasing 3 spring tension latches permitting speedy relamping and cleaning. Sponge neoprene gasket seals out bugs and moisture. Cover can be easily replaced in frame by removing 4 screws—slide out old cover—slide in new—without further adjustment.

FACT: Extremely durable—rugged fiber glass hood does not require paint. Extruded methylmethacrylate cover will not craze or discolor. Wiring is by duplex circuit so when a lamp fails, only one lamp in a reflector goes out.

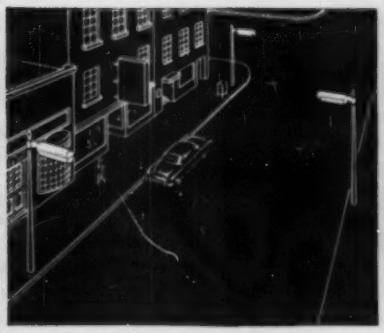
4-FSL-72 can be mounted horizontally or at any angle between 20° and 30° for different light distribution patterns.

For more FACTS see *The Man With The Facts*—your Westinghouse representative.

J-04364

YOU CAN BE **SURE**...IF IT'S

Westinghouse



This exciting new look in street lighting is an attractive addition to any community.

For all the benefits of fluorescent lighting—ask about the new 2-FU-72 for tunnels and underpasses.

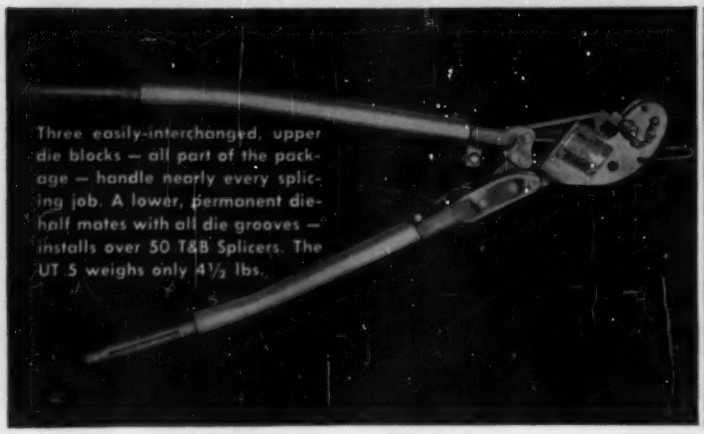
T&B's COMPLETE SPLICING PACKAGE *for*

COPPER
Solid and Stranded
#8 stranded to #2 stranded

ALUMINUM
Solid and Stranded
#6 solid to 2/0 stranded

A.C.S.R.
#6 (6x1) to 1/0 (6x1)

THE UT 5 INSTALLING TOOL...AND THE SPLICERS


Three easily-interchanged, upper die blocks — all part of the package — handle nearly every splicing job. A lower, permanent die-half mates with all die grooves — installs over 50 T&B Splicers. The UT 5 weighs only 4½ lbs.

One UT 5 Installing Tool is all that's needed to splice a wide range of service and distribution conductors. Switch to T&B and use *one* tool instead of many; slash tool costs and inventories to a minimum.

High mechanical advantage of the UT 5 tool minimizes manual effort required to make strong, electrically efficient splices. Hardened steel dies force splicer and conductor into a *square*-sectioned, homogeneous mass. Compound lower die design provides a high-unit-pressure area for installing the steel core of A.C.S.R. Dies are easily changed by loosening a single thumb screw. No tools required. Die grooves and connectors are conveniently letter-coded to assure proper die selection.

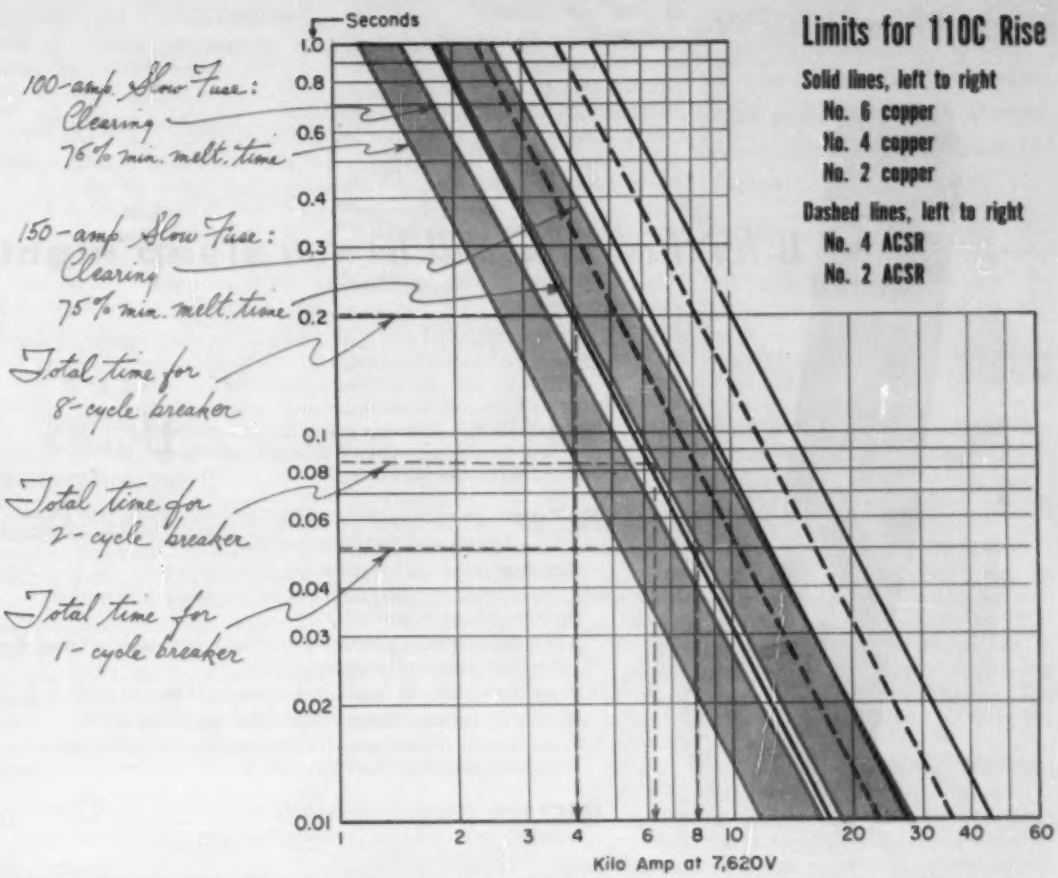
Let your T&B Distributor demonstrate the UT 5 and its many advantages . . . see how one UT 5 does the work of a dozen or more tools.

T&B Bulletin 71 gives the full story on the UT 5 Installing Tool and the wide range of T&B Splicers that it will install. Send for your *free* copy today.

LOOK FOR THIS SIGN —

IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR
The complete line of T&B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs. T-421

THE THOMAS & BETTS CO.
INCORPORATED
14 Butler Street • Elizabeth 1, New Jersey
Thomas & Betts Ltd., Montreal, P.Q., Canada
MANUFACTURERS OF QUALITY ELECTRICAL FITTINGS SINCE 1898



FASTER BREAKER OPERATION extends coordination with line fuses small primary conductors. Fuse curves are plotted as bands limited to higher fault limits, permits substitution of smaller fuses to protect by the clearing time and 75% of the minimum melting time

Burn-down limits of small primaries indicate that . . .

DISTRIBUTION NEEDS FASTER BREAKERS

CHASE HUTCHINSON, Electrical Engineer, Ebasco Services, Inc, New York, N. Y.

Today distribution engineers seek circuit interrupters capable of clearing heavy faults in one to two cycles. They point to the major reduction in wire damage achieved by speeding up oil circuit breakers to 8 cycles some 20 years ago. And they observe the one-cycle clearing of oil circuit reclosers for distribution and 3-cycle clearing of oil breakers for transmission. Why, they ask, can not distribution breakers have similar clearing speeds or reclosers be made large enough to replace them?

This fast clearing is usually required only for heavy faults in the range of perhaps 50 to 100% of the interrupting rating. Slower clearing would be acceptable at lower currents, even to 8 cycles for faults below 15% of interrupting rating in many cases.

The objective in faster clearing is to minimize damage caused by fault currents. Where poles are used jointly with communication facilities, contact may impose power system current on the small conductors and fuses used for communication. Prompt clearing of such faults reduces the likelihood of the fault spreading to other communication circuits.

Heating Cuts Conductor Strength . . . Protection of hard drawn conductors against the heating caused by fault currents is another objective. Loss of strength is rapid at temperatures much above 100C. Faults usually are of such short duration that all the heat can be assumed to be stored in the

Why this cable will let you **sleep nights**

Everyone concerned with maintenance wants to minimize those calls about out-of-service lines—calls that always seem to come at night.

There *are* but a few premium quality cables—well designed, well made, quality controlled, tested—which *will* reduce your cable failure problems to an absolute minimum.

One of these power cables is Rome's service-tested and proven RoZone-RoPrene.

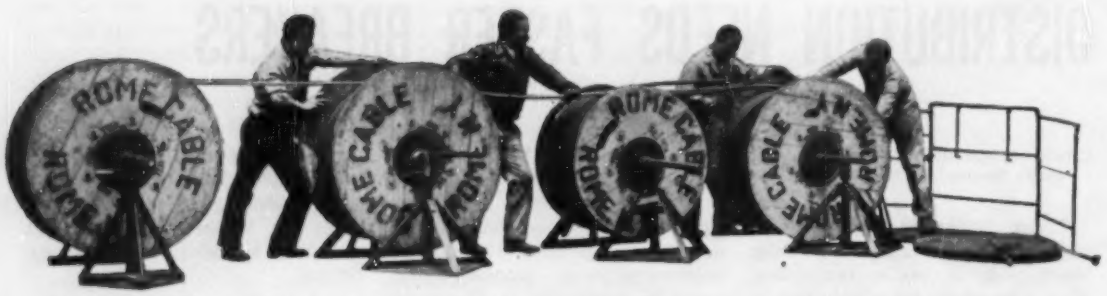
RoZone—premium quality, oil-base type insulations give you—

- High dielectric and impulse strength
- Excellent resistance to corona and ozone cutting
- High resistance to effects of moisture (superior in this respect to other rubber compounds)
- Electrical properties practically unaffected by long-time immersion in water or burial in the ground
- Long life (maintains desirable characteristics for many years)
- Versatility (recommended for voltages from 600 to 15000)
- Guarantee of correct manufacture through the ionization testing of every foot of RoZone-RoPrene, rated at 3000V or over.

RoPrene—rugged, specially designed Neoprene sheath gives you—

- Strength and toughness (abrasion resistance provides maximum mechanical protection)
- Resistant to fire (accepted as standard sheath for mining cable where flame resistance is a mandatory requirement of Safety Codes)
- Excellent heat resistance (withstands continuous temperatures up to 75°C. without deterioration)

It will pay you to investigate the advantages of this quality cable—RoZone-RoPrene. Write for detailed data. Rome's personalized engineering help is yours for the asking.



Rome RoZone-RoPrene network cable being installed in Pacific Gas and Electric 600-volt underground distribution system in downtown San Francisco.

It Costs Less to Buy the Best

ROME CABLE
Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

conductor. The time required for a given temperature rise may be approximated by the equation

$$t = \left[\frac{A}{KI}\right]^2$$

where A = conductor cross section in circular mils,
K = constant for a given temperature rise,
I = current

Time varies inversely as I^2 for a given conductor size and temperature rise. And it is possible to determine the permissible I^2t for each conductor to achieve acceptable life under fault conditions.

Today's I²ts Threaten Wires . . . Values of I^2t existing on parts of many urban distribution systems today exceed values conducive to retention of mechanical strength in No. 6 or No. 4 copper. Systems operating at 12.47 and 13.8 kv can use these small conductors more effectively than lower voltage systems to serve the load. But the large substations common to the higher voltage distribution may provide high fault currents over extensive portions of the system.

Conductor heating by such faults can be held within acceptable limits by either or a combination of these two methods:

1. Controlling fault current to safe limits.

2. Reducing duration of fault current flow.

It is apparent that cutting clearing time ½ or ⅓ of present values provides substantial benefits to small conductors.

Breaker-Fuse Coordination Protects . . . Coordinating line fuses with station breakers so the breaker protects the fuse on its first operation and blows it before final lock-out for a persistent fault has worked well, particularly for higher voltage systems. But the greater size and number of substations necessitated by load growth during recent years has boosted possible fault currents on the distribution conductors. Coordination today requires larger sectionalizing fuses, some of which cannot protect small distribution conductors. A typical case is illustrated by curves plotted in the diagram on p 25.

Reducing the fuse size is the only effective method of protecting these small conductors. But the diagram shows that a 150-amp fuse must be used at a location having 4,000 amp fault capability to coordinate with an 8-cycle breaker. If clearing time of the breaker can be cut to two cycles, a 100-amp fuse can be used. And a one-cycle device would permit a further reduction in the rating of coordinated fuses.

When an arc occurs between covered overhead conductors, the metal melts rapidly. If current is great enough or flows long enough, the conductor fails mechanically. Several tests have established the time-current limits to avoid burn-down from arcing faults. These limits are compared with EEI-NEMA standard fuse characteristics in a recent engineering paper by the AIEE-EEI Joint Working Group.

Wind and magnetic forces usually cause arc movement for considerable distances on bare conductor, often limiting damage to small pits which do not seriously impair conductor strength. Time-current limits for such conditions vary widely. But it is clear that reduction of fault current or duration usually cuts the extent of conductor damage on both covered and bare conductors.

Faster Operation Has Value . . . It is difficult to evaluate all the factors that are improved by faster breaker clearing time. But one possible approximation might be the cost of reactors to achieve equivalent benefits. Suppose the bus of a 13.8-kv distribution substation is capable of 8,000 amp fault current. This current must be held to 4,000 amp to permit 150-amp sectionalizing fuses with an 8-cycle breaker. A reactor to achieve this might be purchased for $3,500, but evaluation of installation cost, substation space, I^2X losses, I^2R losses and capitalized annual maintenance could boost the total to $7,000 to $8,000.

Equally effective protection could be provided by clearing the 8,000 amp with a one-cycle device. In this manner the faster interruptor is indicated to have greater value in this application equal to the total cost of the reactor which it makes unnecessary, estimated at $7,000 to $8,000. Other conditions of application, and more exact estimates may reduce the incremental value of the faster clearing. But there is no doubt that fast fault clearing offers real and lasting benefits to distribution.

Water Saving . . .

. . . by commercial and industrial users ordered in Denver. Air-conditioning equipment affected

Commercial and industrial water users in Denver have been ordered by the city's Water Board to install re-circulation devices in order to conserve water.

Cooling and air-conditioning equipment having a capacity of two tons or more of refrigeration and those using more than 20,000 gal of water per month in cooling, heating, or industrial processing are affected.

Most of the re-circulation devices are electrically operated.

Earl L. Mosley, superintendent of the Denver water system, said the order is "not going to stop air conditioning and refrigeration but it is going to require the efficient use of water under standard engineering specifications. Regulations of this kind are being adopted all over the country."

The order requires that all cooling, heating, and industrial processing systems installed after Dec. 15, 1954 be equipped with approved conservation devices; existing cooling systems having a capacity of less than two tons of refrigeration must be equipped with water-saving devices by Feb. 1, 1955; after Feb. 1, all evaporative cooling units must be equipped with water-saving devices. Firms with cooling or air-conditioning systems of two tons or more capacity of refrigeration and firms using more than 20,000 gal of water a month in cooling, heating, or industrial processing must install water-saving devices by June 1.

Decision on Lake Level

Oklahoma Attorney General Mac Q. Williamson ruled recently that neither the state legislature nor Grand River Dam Authority may restrict GRDA hydroelectric production to maintain a certain level on Grand Lake. Resort owners had sought to set a level below which water could not be drawn. They require a certain amount of water for recreational facilities at the big lake in northeast Oklahoma.

The lamp and socket swing down as part of the glassware assembly, become automatically de-energized for quick, Service-Safe re-lamping during circuit operation.

The refractor assembly swings wide open on the house side, for easy re-lamping. Refractor assembly can be removed easily but not accidentally.

Make-before-break action of contacts . . .

L-M's New Series Ovalite is Automatically De-Energized with New Service-Safe Feature

Both lamp and socket are automatically de-energized and isolated from series circuit when glassware swings down. Make-before-break action of contacts in series luminaire eliminates arcing.

By **DEAN W. MORRILL**, Lighting Application Engineer, Line Material Company

L-M's new mercury vapor Ovalite offers outstanding design features for safe, economical servicing of the luminaire, in addition to its efficient light distribution.

The lamp and socket swing down as part of the glassware assembly; as the socket leaves the receptacle, it becomes automatically de-energized, and much more accessible for quick, safe re-lamping of the luminaire during circuit operation, saving service time.

Contacts on the series Ovalite are so designed that there is a make-before-break action, which means the lamp connections are shunted before they are disconnected. In restoring the connection the same principle applies. The lamp connection is made before the shunt is opened, eliminating arcing.

The contacts are silver-plated beryllium copper; socket is steatite; receptacle is wet-process glazed porcelain with a 5,000-volt insulation rating which meets EEI-NEMA specification of 19,000 volts withstand.

This new Ovalite provides a choice of horizontal or pendant mounting for mercury vapor; choice of types III or IV light-distribution patterns.

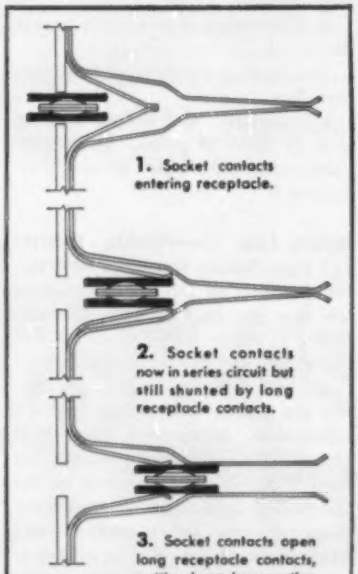
The Service-Safe feature of L-M's Ovalite is available in both multiple and series luminaires.

Get Complete Information

This series luminaire is specifically designed for the Uni-Ballast system. Ask the L-M Field Engineer or Lighting Engineer for information on the new L-M Ovalite; on Uni-Ballast, the most economical system for mercury vapor lighting; and on L-M's Lighting Recommendation Service. Or write Line Material Co., Milwaukee 1, Wis. (a McGraw Electric Company Division).

"Ovalite," "Uni-Ballast" and "Service-Safe" are Line Material Company trademarks.

211



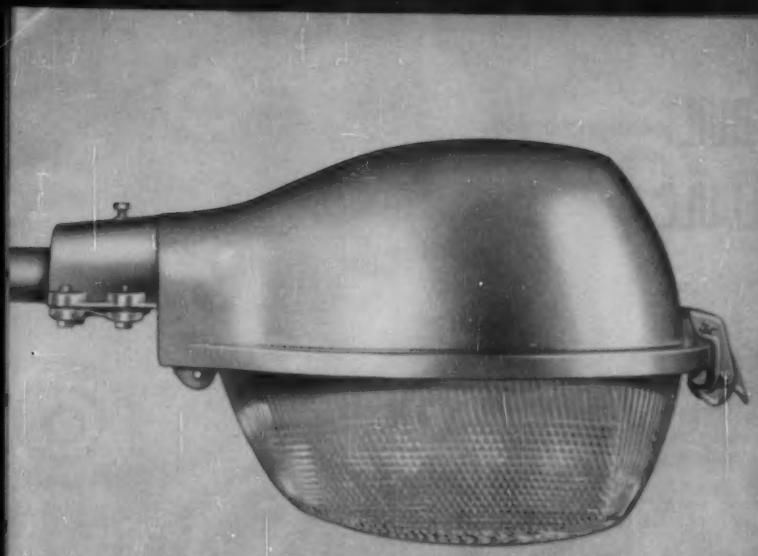
1. Socket contacts entering receptacle.

2. Socket contacts now in series circuit but still shunted by long receptacle contacts.

3. Socket contacts open long receptacle contacts, putting lamp in operation in series circuit.

NOTE—Procedure is reversed when socket is withdrawn during luminaire opening. Lamp is shunted before being withdrawn from circuit. This make-before-break action eliminates arcing.

LINE MATERIAL
Street Lighting



L-M's new mercury vapor Ovalite has high co-efficient of utilization on the street side, with a choice of types III or IV asymmetric light distribution merely by changing glassware.

Lamp and socket swing down, become automatically de-energized for quick, Service-Safe re-lamping during circuit operation.

Wiping-action contacts open circuit on multiple unit...

Now Quick Re-Lamping Possible with Ovalite's Automatic De-Energizing Feature

New Service-Safe design automatically isolates lamp and socket from circuit. As luminaire is closed, circuit is completed by means of wiping-action silver-plated beryllium copper contacts.

By **STACY STANDLEY**
Manager of Lighting Sales
Line Material Company

Here's a new feature in luminaire design that offers savings in servicing. L-M's Ovalite lamp and socket are automatically de-energized and isolated to provide quick, safe re-lamping of the luminaire during circuit operation.

The lamp and socket are part of the refractor assembly. On this multiple unit, wiping-action contacts open as the assembly is swung down, isolating the lamp and socket from the circuit and providing easy, safe access to the luminaire. The wiping action keeps the contacts clean.

The Service-Safe feature is also available on L-M's series Ovalite. This series Ovalite has a shunting make-before-break action.

Other Outstanding Features of L-M's Ovalite

Choice of type III or IV light-distribution pattern by simply changing the glassware.

High co-efficient of utilization on street side.

Latch automatically assures positive closing of luminaire when refractor is pushed up.

Both latch and hinge have a spring action to hold the refractor firmly against the gasket, assuring a bugproof, dustproof, and weatherproof seal.

Complete refractor assembly can be removed easily when desired, cannot be accidentally unhooked.

Hood is a smoothly finished one-piece aluminum casting.

One-piece aluminum reflector.

All hardware is stainless steel or non-ferrous metal.

No trapped light at the glassware junction.

Reflector and refractor are easily cleaned.

Get Complete Information

Ask the L-M Field Engineer or Lighting Engineer for information on the new L-M Ovalite, and on L-M's Lighting Recommendation Service. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division.)

"Ovalite" and "Service-Safe" are Line Material Company trademarks.

LINE MATERIAL *Street Lighting*

75-MILE, 230-KV LINE BUILT 5 WEEKS AHEAD OF SCHEDULE

Construction know-how, together with dry weather, enabled Duke Power Co to raise its $6-million, 75-mile, 230-kv Riverbend-Tiger line (EW, Sept. 6, p 85) recently in just 200 working days. Techniques and devices employed by the contractor, R. H. Bouligny, Inc, Charlotte, N. C., in completing the work five weeks ahead of schedule included these:

1. Radio communications instead of flagman during the pull-up phase.

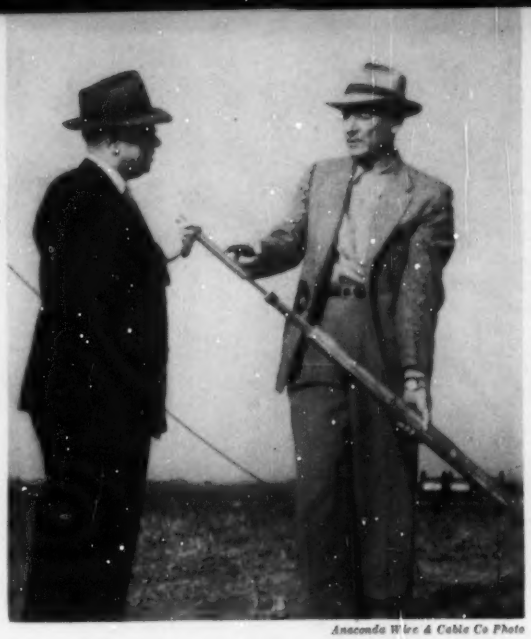
2. A light-weight aluminum ginpole to speed tower erection.

3. Cable trucks from which linemen could pay off three cables at a time.

4. A 54-in. auger to speed digging.

5. Elimination of temporary dead-ends.

As a result, Duke Power will be able to transmit power at five times its former capacity as soon as all installations have been made.



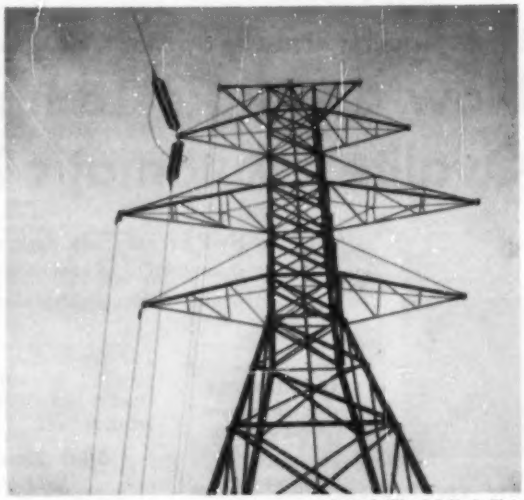
Anaconda Wire & Cable Co Photo

SPLICES were easy on the ACSR line, splicers cutting back 6 in. on aluminum strands down to steel core. Sleeve was slipped over core

New Line . . . The new line, carrying steam-generated power in large blocks from the Riverbend Plant across Piedmont County to Duncan, S. C., is the first leg of a projected high-voltage network designed to serve customers for many years to come in an area more than 20,000 miles square. During 1953 these customers consumed more than 9 million kwhr, and Duke Power is planning system developments with a view to the doubling of its load in the next decade.

The conductor on the new line is 795 MCM, 26/7 ACSR, with a diameter of 1.10 in. There are 441 all-steel towers. Average span is 900 ft. This line was designed (National Electric Safety Code for the territory) for ¼-in. ice, 4-lb wind, at 15F, with a constant of 0.22 lb. The company's experience, however, indicated a heavier loading.

The towers rising 120 ft above ground, are much larger than those heretofore used on Duke's system. The tower legs are fastened to stub angles which go down about 10 ft on the average, where they are bolted to a grillage of steel trough plates.



Anaconda Wire & Cable Co Photo

TRANSMISSION TOWER (above) closeup shows method of stringing through blocks. Cable truck (below) pays out three cables at once

Communication Speedup . . . Using flagmen on high ground to signal from one point to another proved time consuming during the first pull-up and sag stages of construction. It took a day and a half to handle the first 3½ miles of line. At such a rate Duke's engineers figured, the job would run far behind schedule. It was found that by locating portable radio transmitter-receivers and walkie-talkies at strategic communication points crews could pull up and sag at the rate of about a mile an hour.

When this rate proved too fast for the tower men, it was apparent that faster digging and tower erection were called for. A new 54-in. auger that could chew a 9-ft hole in hard ground at a foot a minute was brought up to work alongside the 48-in. augur already on the job. Tower erection was speeded by the use of a new light-weight

Anaconda Wire & Cable Co Photo

DIGGING HEAD of the 48-in. auger helped Duke Power to speed construction on 230-kv line. In the background is the 84-ft ginpole

Anaconda Wire & Cable Co Photo

TOWERS were erected in record time when two augers were employed. Overbuild (in photo below) was heavy due to many small cross-roads

aluminum gin pole. Although the pole is 84 ft long, it weighs only 600 lb. Working heads of the contractor's own design were incorporated into it.

Cable Trucks . . . The cable trucks on the job were a large factor in closing the gap between tower construction and line crews. These trucks allowed linemen to pay off three cables at a time, pulled by one tractor.

On the truck a special framework was fabricated and mounted so that the ACSR-loaded cable reels could be loaded at the storage yard three reels at a time. Reel stations were determined, of course, by the amount of cable on each reel. Under its own power, the reel station was hauled to the pre-determined wire-stringing location ahead of the transmission line section under construction. Once at site, the truck stayed there, ready for pull-up crew as it came up with end of previous run.

Meanwhile, the driver had returned down the line to pick up the empty reels on the truck reel stations placed earlier in the day. He drove it back to the yard, saw it safely loaded, and came back along the line to the new station site. In this construction phase, the two-way radios came in handy, helping the line-stringing crew to anticipate what they would need and preventing bottlenecks.

Many Crossovers . . . Many clearance poles were used in the new system installation. The Carolinas are served by a multiplicity of small roads in a network feeding major cross-country highways. At one point within two spans, stringing crews made six or seven crossings.

Through-type strain clamps were used so that the conductor was carried through the clamps to avoid bolted jumper connections. No temporary dead-ends were made; instead, the line stringers sagged from one strain tower to the next. They experienced little difficulty in obtaining an even sag despite the fact that some pulls extended more than three miles.

Eleven inspectors, under a field engineer, were constantly on the job. Four accompanied the stringing crews, watching for conductor protection, installing targets, and checking sag. Another inspector remained with the splicing crew. Six inspectors-at-large moved up and down the line, checking the staking, footing, tower-erection, and armor-rodding crews.

System Fully Protected . . . Duke's system has built-in extra-safe protective features. Each 230-kv circuit terminates through an oil cricuit breaker which in turn is controlled automatically by protecting relays. Oil breakers have an interrupting capacity of 5-million kva. It takes only 1/20 sec for them to open the high-voltage circuit, then automatically recharge the line service in a total lapsed time of ⅓ sec.

Protective relays detect line faults or abnormal circuit conditions. They set up a radio frequency signal which is superimposed on the 230-kv circuit and insures simultaneous opening of both terminals of a faulted line.

Suspension-type towers are equipped with 18 insulators and afford a clearance of 9½ ft between steel cross-arm and conductor. Duke Power anticipates that lightning will cause but one instantaneous trip-out per two years, which makes the system virtually lightning-proof.

Duke Power has built the backbone of its heavy-duty transmission system with a view to building more high-voltage links as demand justifies such expansion.

Tampa Electric Story Told as . . .

Tiny Plant Lights Up Toy Town

Tampa Electric Co sets up its own Christmas toyland wherever it brings its public relations message.

To illustrate utility operations before science classes, civic clubs, and other groups, the company uses a miniature power plant and community, both highly realistic in details. Originator of this presentation is James A. Banton, Tampa Electric illuminating engineer, who does the talking.

Banton, who is frequently called upon to explain electrical generation, transmission, and distribution, sought a means of vitalizing his material. A suitable miniature power plant was located in Germany and flown to Tampa, Fla., to form the nucleus of his display. Plastic houses and other buildings, forming a typical community, were obtained locally, and the whole presentation was assembled by a local display and advertising firm.

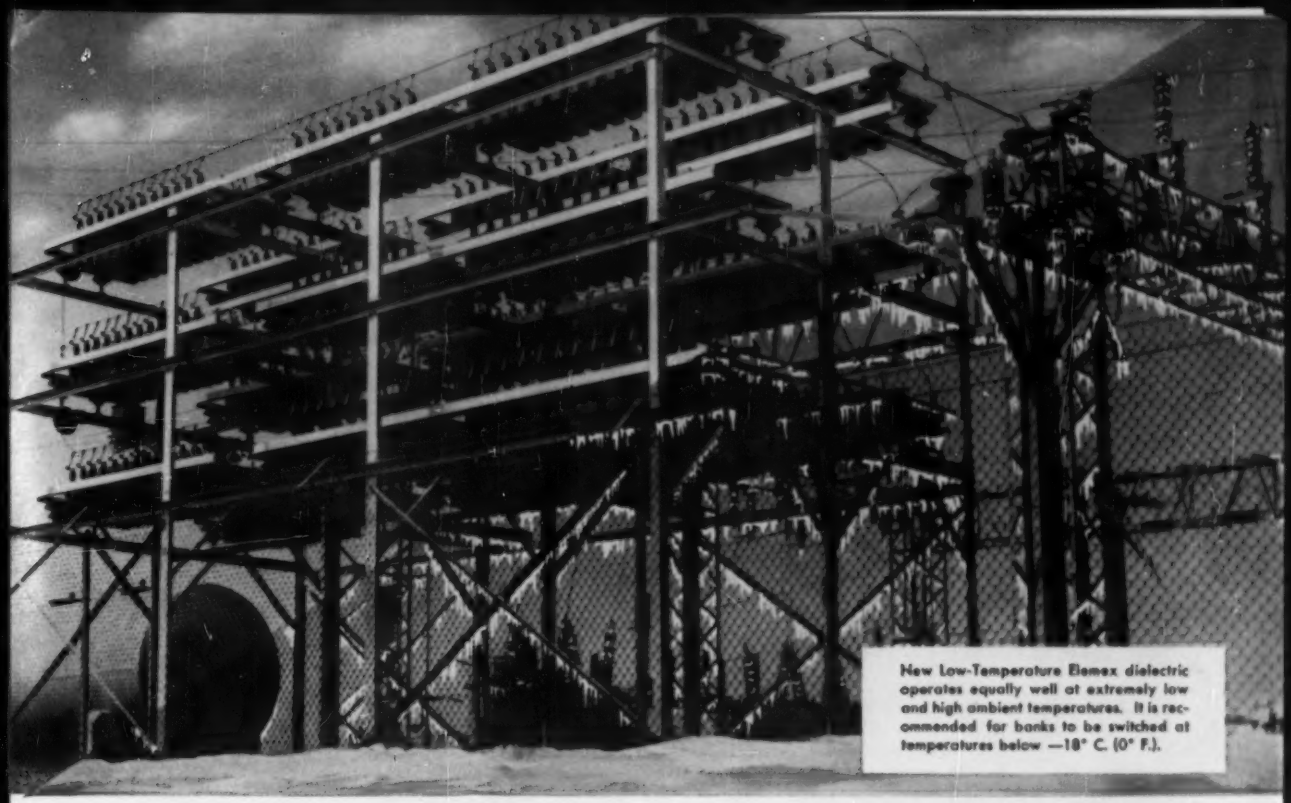
The display is on two specially constructed tables with folding legs and removable tops. On one table is the power plant, a substation, and a transmission line pole from which conductors are strung to the other table 6 ft away. On the second table is the Lilliputian community complete with distribution system, streets, street lights, and plastic buildings and houses.

Banton begins by explaining operations in the manufacture and distribution of electricity, indicating each step by means of the miniature equipment. Meanwhile an assistant fires the boiler and builds up a head of steam. When pressure is sufficient, the steam is turned into the engine which is belted to a small ac generator. The latter generates enough electricity to light several small lamps.

The power plant is authentic in every detail. It consists of a horizontal boiler, complete with steam dome, water gauge glass, steam pressure gauge, safety valve, whistle, and feed water injector, all actually operating. The boiler is fired by a small alcohol burner. Steam is fed to a small reciprocating engine equipped with a ball-type governor and a large fly wheel which is belted to the generator. The generator turns at 4,000 rpm and generates 2.5-v ac.

Behind the power plant is a substation complete with "dummy" transformers, obtained from General Electric Co, and overhead buses on tiny insulators to which the transformers are realistically connected. Replacing but resembling a voltage regulator is a toy train transformer which supplies 14 v to the bus. Conductors run from the bus to the transmission pole on the table's edge and from thence to a distribution pole on the other table.

When the display is shown to a school group, arrangements are made in advance with the school authorities to designate a girl and boy to assist as "plant engineer" and "lineman."



New Low-Temperature Elemex dielectric operates equally well at extremely low and high ambient temperatures. It is recommended for banks to be switched at temperatures below —18° C. (0° F.).

Switch Capacitors In Any Weather With New Low-Temperature ELEMEX®

When capacitors are continuously energized, they automatically maintain safe internal temperatures. But a switched capacitor that is disconnected from the line during low ambient temperatures is subject to congealing or freezing of the dielectric liquid, depending upon the length of time the capacitor is de-energized.

Energizing Warms Capacitor

If the dielectric reaches temperatures down to —18° C., re-energizing the capacitor will quickly warm the dielectric back to a safe operating temperature. But if the temperature drops below —18° C., and the capacitor is de-energized for some hours, the danger of failure is greatly increased, and the failure of some units in banks switched at these extreme low temperatures may be expected.

Users of standard Elemex capacitors have been especially fortunate in this respect because the flexible tank sides of Elemex capacitors do, to some extent, compensate for the contraction of the liquid at low temperatures and somewhat reduce the extent of voids in the congealed liquid.

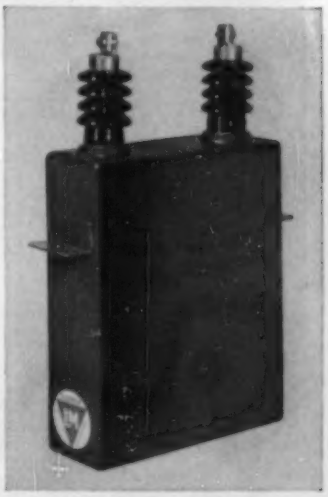
Lower Freezing Point Needed

But as switched installations increase, particularly in areas subject to extremely low temperatures, it is desirable to use a dielectric which can stand much lower ambient temperatures without congealing. Therefore capacitors with Low-Temperature Elemex liquid are now supplied upon request, without extra charge.

Low-Temperature Elemex remains liquid at very low temperatures. It can be safely used in switched installations with temperatures as low as —40° C. Also, Low-Temperature Elemex capacitors operate as satisfactorily under higher ambient temperature conditions as do those with standard Elemex.

Want Capacitor Application Data?

For complete information on the construction and application of Elemex Capacitors, ask the L-M Field Engineer for bulletins. L-M makes a wide variety of data available. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



Elemex Capacitors offer many other desirable features—solder-sealed bushings with Para-groove connectors; exceptionally low rate of failure. Get details on their construction.

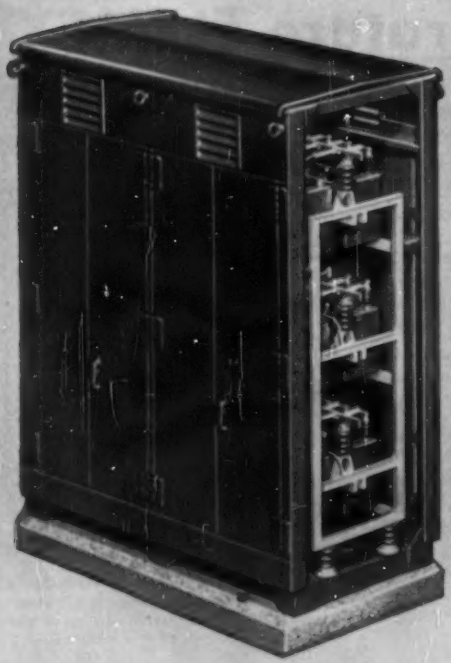
LINE MATERIAL

197

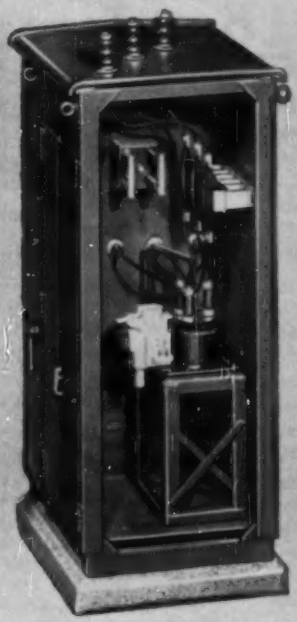
Elemex® Capacitors

"Elemex" is a registered trade-mark of the Line Material Company

Scale models of L-M Metal-Enclosed Capacitor Equipments. At extreme right is control compartment; next, the oil circuit breaker compartment; center, an 1800 kvar compartment with doors opened to show Elemex individually fused capacitors in racks.

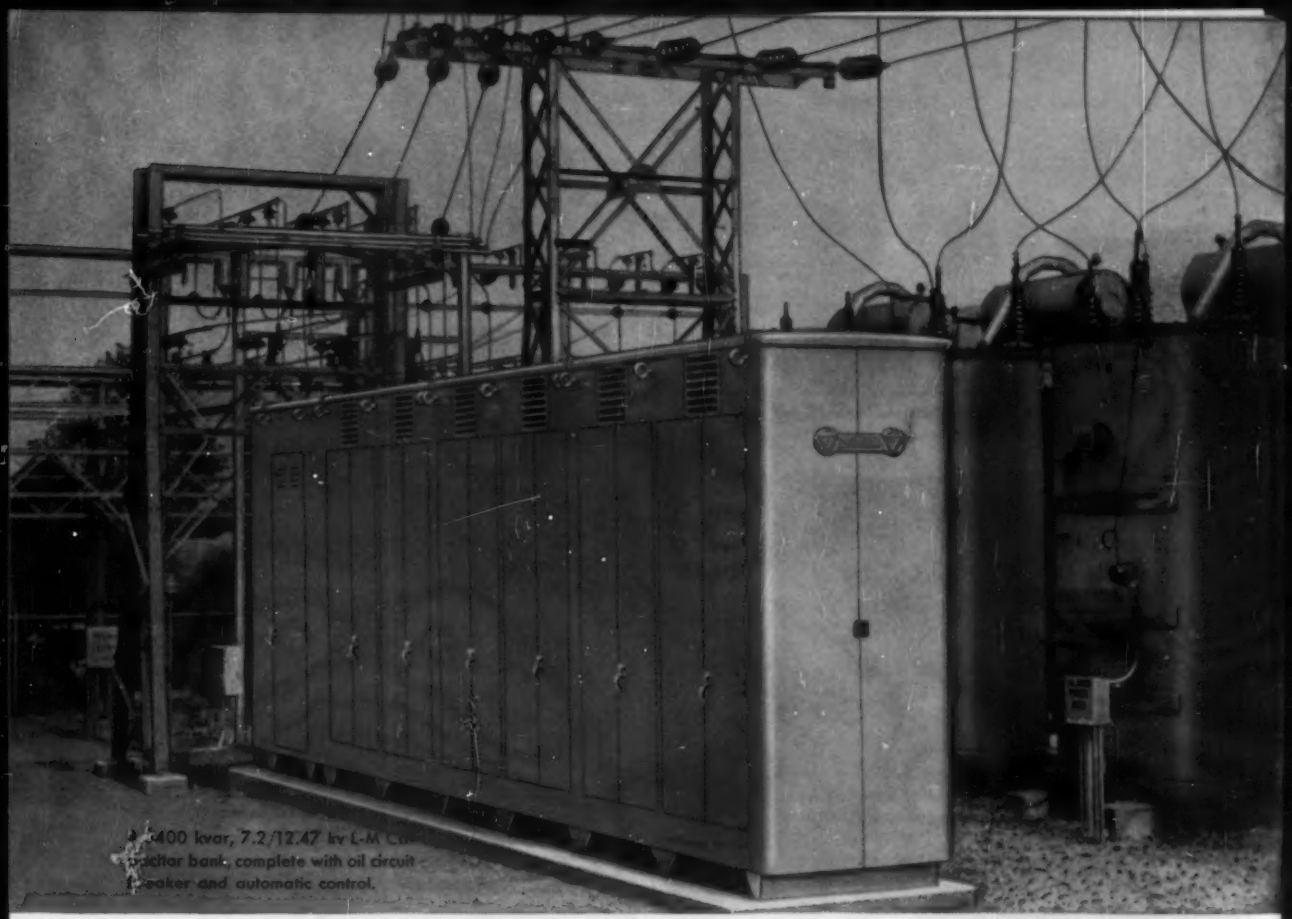


Scale model of an 1800 kvar capacitor compartment, showing how capacitor units and fuses are mounted on insulated inner rack behind interlocked doors.



Typical oil circuit breaker compartment includes breaker, current and potential transformers, and accessories.

Typical control panel with overcurrent relays, ammeters, recording voltmeter, voltage control, and other necessary relays and control switches.



2400 kvar, 7.2/12.47 kv L-M Ca... capacitor bank, complete with oil circuit breaker and automatic control.

L-M's Metal-Enclosed Capacitor Equipments Provide Wide Choice of Sizes and Arrangements

by **N. K. DELANEY**
Manager of Capacitor Sales
Line Material Company

L-M's Metal-Enclosed Capacitor Equipments provide a self-contained three-phase bank with or without switching equipment and complete controls. The assembly makes a neat-appearing installation; is extremely compact; and provides a high degree of safety, because no live parts are accessible except through doors which are interlocked with the short-circuiting and grounding switch.

L-M's Metal-Enclosed Capacitor Equipments provide wide flexibility. All control equipment is in one compartment. A second compartment contains the circuit breaker, current and potential transformers, and short-circuiting and grounding switch.

Capacitor compartments contain racks of Elemex capacitors. Sizes range from 600 to 1800 kvar, and voltages from 2400 to 13,800. These compartments are provided with thermostatically controlled cooling fans, and doors interlocked with the grounding switch. Equipments are exceptionally rigid, heavy steel, completely finished for long protection against weather. All capacitors have individual bus-mounted flameless fuses with indicating feature. A variety of convenient accessories is available. Connections may be underground through potheads, or to bushings at top of breaker or power entrance compartment.

Get The Details

Ask the L-M Field Engineer for complete information about L-M Metal-Enclosed Capacitor Equipments and about L-M's Complete Capacitor Application Engineering Service. Or write Line Material Co., Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

Sizes and Ratings Available

L-M Metal-Enclosed Capacitor Equipments are available in the following NEMA-standard ratings:

2400/4160 volts: 600, 900, 1200, 1800, 2700, and 3600 kvar.

4800, 7200, 12,470, and 13,800 volts: 900, 1800, 2700, 3600, 4500, and 5400 kvar.

In 5 kv class equipments the capacitor compartments are in 600, 900, 1200, and 1800 kvar sizes.

In 8.7 and 15 kv class equipments standard compartment sizes are 900 and 1800 kvar.

186

LINE MATERIAL *Elemex®* **Capacitors**

Union Electric of Missouri Makes Certain Its Drivers Are Good

SCIENTIFIC EQUIPMENT is used to test Margie Taylor's speed of reaction. Instructor explains how it works

MINIATURE ROAD SIGNS are used by Instructor Murray Ligon in a quiz on traffic signs and regulations

Union Electric Co of Missouri is taking steps to see that its employees are among the best and the safest drivers on the road. By instituting a safe-driving program, the company hopes to reduce to a minimum the number of accidents involving company-owned vehicles.

All employees who are authorized to use company cars have been issued driving permits which state the kind of vehicles they can operate. All new employees who will drive cars are being asked to take driver reaction tests. Those already authorized to drive are being urged to take the same tests.

The reaction tests make use of scientific equipment to measure a driver's distance judgment, stopping capability, field of vision, and clarity of sight. Each driver also is given oral examinations on traffic practices, signs, and signals. He (or she, as is the case of the Union Electric employees pictured on this page and the next) is road-tested for ability to handle the type of vehicle to be operated on the job.

SLIDE VISION is determined by this instrument. Test tells how far side pieces can be moved and still remain visible to an individual

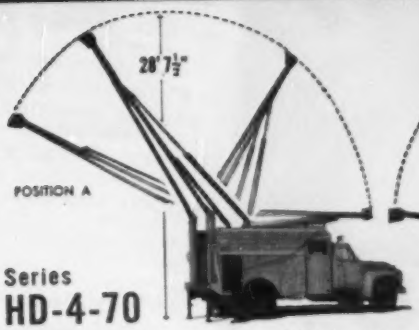
BLINKER LIGHT SYSTEM on Union Electric car is explained by Ligon to his pupil before she starts out on road test

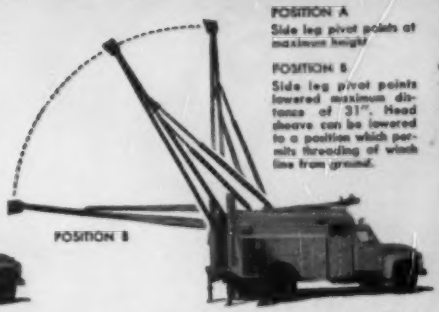
DISTANCE JUDGMENT test consists of lining up cars from seeing reflection in mirror. Mary O'Connell is set to try her skill

After taking the tests . . .

POWERS *American*

"Pole-Master"
HYDRAULIC DERRICKS





POSITION A
Side leg pivot points at maximum height

POSITION B
Side leg pivot points lowered maximum distance of 31". Head sheave can be lowered to a position which permits threading of winch line from ground.

Series HD-4-70

Handles poles up to 75' in length

SERIES HD-4-55, constructed and operated same as HD-4-70 Pole-Master, has 22' 9" ground-to-head sheave height.

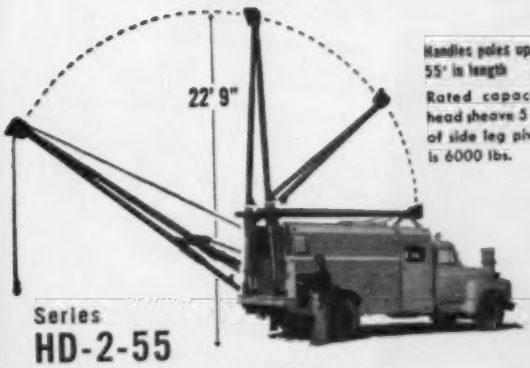
This is a heavy-duty derrick which can be operated by one man. Every movement—from carrying position to any point within the operating range—is hydraulically actuated. Shifting of control levers is the only manual requirement.

The derrick can be spotted in any position selected by the operator . . . and can be moved under load.

What's more, the position of the head sheave can be raised or lowered a distance of 31" . . . hydraulically . . . without changing angle of elevation.

With head sheave fully extended, 5 ft. to rear of side leg pivot points, the derrick has a capacity of 9000 lbs.

Complete details are given in Powers-American Bulletin No. 407. A copy, with quotation, is yours for the asking.



Handles poles up to 55' in length

Rated capacity, with head sheave 5 ft. to rear of side leg pivot points, is 6000 lbs.

- LIVE BOOM — CAN BE OPERATED UNDER LOAD
- HYDRAULIC HEIGHT ADJUSTMENT
- CAN BE USED WITH SINGLE-DRUM WINCH
- NO BODY LOAD AREA OBSTRUCTION — NO DANGEROUS EXPOSED MECHANISM

Series HD-2-55

Operation is completely hydraulic. Insertion and removal of locking pins, and shifting of control is the only manual requirement.

The derrick can be spotted in an unlimited number of positions, and moved while under load. It will lift loads to body cargo area.

Descriptive Bulletin No. 405R, with quotation, will be sent on request.

SERIES HD-2-40 Same as above, with 20' 10" ground-to-head sheave height.

POWERS-AMERICAN DIVISION

McCABE-POWERS AUTO BODY COMPANY

5900 NO. BROADWAY • ST. LOUIS 15, MO.
625 CEDAR STREET • BERKELEY 10, CALIF.

. . . the girls get their driving papers

After successful completion of the safety tests the girls are authorized to drive company cars. Mary (top photo) receives her permit from Monroe C. Alves, superintendent of motor transportation department. Below, Margie drives Union Electric car out of the garage on her way to cooking school.

January Meeting Calendar

Week of Jan. 2-8

NORTHEASTERN WEED CONTROL CONFERENCE

Annual Meeting, New Yorker Hotel, New York, Jan. 5-7, 1955.

PUBLIC INFORMATION PROGRAM

West North Central Region, Martin Hotel, Sioux City, Iowa, Jan. 6; Workshop Conference Committee, Blackstone Hotel, Chicago, Jan. 14; Mid-Atlantic Region, Seaview Country Club, Absecon, N. J., Jan. 21, 1955.

Week of Jan. 9-15

ELECTRICAL EQUIPMENT REPRESENTATIVES ASSOCIATION

Annual Meeting, Breakers, Palm Beach, Fla., Jan. 10-12, 1955.

***NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS**

Appliance Division, Conrad Hilton Hotel, Chicago, Jan. 12-14, 1955.

NATIONAL ASSOCIATION OF PURCHASING AGENTS

Third Region, Jefferson Hotel, St. Louis, Jan. 13-14, 1955.

Week of Jan. 16-22

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

High Frequency Measurement Conference, Hotel Statler, Washington, D. C., Jan. 17-19; Winter General Meeting, Hotel Statler, New York, Jan. 31-Feb. 4, 1955.

EDISON ELECTRIC INSTITUTE

Industrial Relations Committee, EEI Headquarters, New York, Jan. 20, Power and Heating Committee, Atlanta Biltmore Hotel, Atlanta, Ga., Jan. 31-Feb. 1; Prime Movers Committee, Grand Hotel, Mobile, Ala., Jan. 31-Feb. 1, 1955.

Week of Jan. 23-29

DOBLE ENGINEERING CONFERENCE

22nd Annual Meeting, Sheraton Plaza Hotel, Boston, Jan. 24-28, 1955.

***CANADIAN ELECTRICAL ASSOCIATION**

Eastern Zone, All Divisions, Sheraton-Brock Hotel, Niagara Falls, Ont., Jan. 25-28, 1955.

PACIFIC COAST ELECTRICAL ASSOCIATION

Business Development Section, Hotel California, Fresno, Calif., Jan. 27-28, 1955.

*Additions this week.

Asks Subscription TV OK

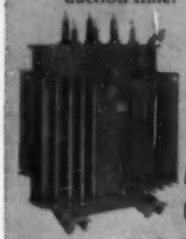
Zenith Radio Corp has asked the Federal Communications Commission to authorize immediate commercial operation of subscription television by properly equipped TV stations. The request pointed out that FCC has legal authority to expedite subscription operation by granting a simple modification of existing TV station licenses without prolonged formal hearings.

Today's best buy!

PENNSYLVANIA
Standard Parts
POWER TRANSFORMERS

Faster deliveries are assured

when you order Pennsylvania Standard Parts Power Transformers. That's because quantity production methods of manufacturing, coupled with the use of standard designs and standard parts, shorten engineering and production time.

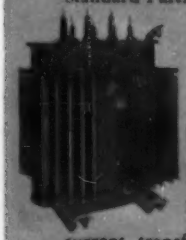


A wide range of optional voltages

is permitted with Pennsylvania Standard Parts Power Transformers, including 2 taps above and 2 taps below the primary voltage.

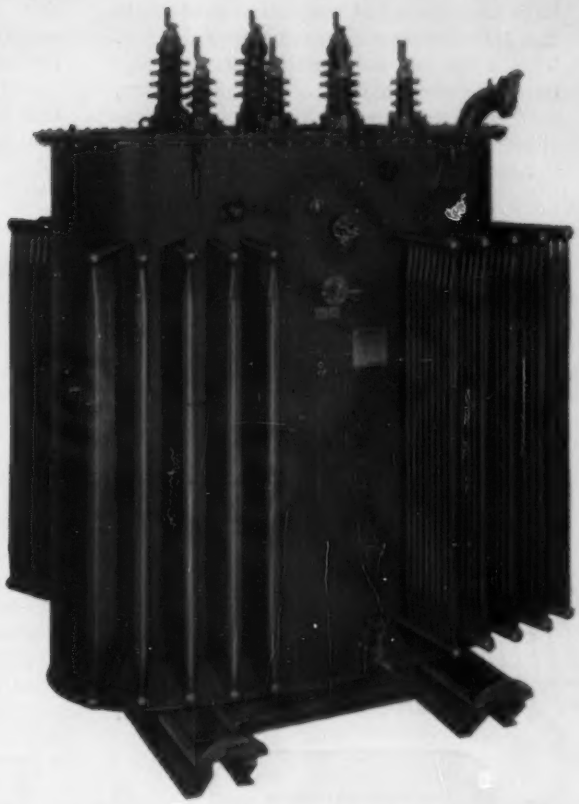
You have a choice of the method of oil preservation

in the larger ratings of Pennsylvania Standard Parts Power Transformers.



Optional equipment such as

current transformers, high voltage switches, etc., are available with Pennsylvania Standard Parts Power Transformers at regular prices, without any penalty being added to the base price of the transformer.



If your requirements call for power transformers in sizes up to 5,000 Kva, single phase, and 10,000 Kva, three phase — 69 Kv or less — then by all means find out about Pennsylvania Standard Parts Power Transformers. You will save up to 8% in capital investment, and get quicker deliveries. An example of this is the 2500 Kva, three phase Pennsylvania Standard Parts Power Transformer pictured above. This transformer cost the purchaser $1026.00 less because he specified Standard Parts.

Pennsylvania Transformer Company

A McGRAW ELECTRIC COMPANY DIVISION

CANONSBURG, PA., Greater Pittsburgh District

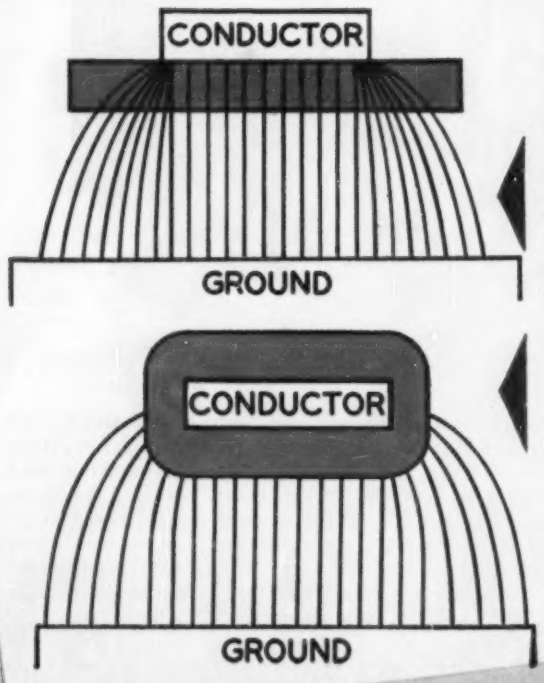
Why Worry About Corona?

Corona can be eliminated: Tests of many different designs and insulations over long periods under extreme voltage conditions prove it. Lessons learned from these tests have been applied at the thousands of points in a transformer where corona may develop. This is the first step in elimination of this damaging phenomenon. Proper dimensions, modifications in shapes, and careful application of latest insulation techniques are needed.

Allis-Chalmers applies these principles to all its power transformers. As a result, from the design standpoint, they merit the reassuring designation "corona-free."

But Allis-Chalmers does not stop with design. In addition, each transformer is thoroughly tested before shipment to provide a final check. When you buy an Allis-Chalmers power transformer you get a transformer that stays young because there is no corona that can cause damage.

How Corona Cuts Transformer Life



Corona is the cause of unexpected failure. It is a condition created by slight weaknesses in insulation or design. Its effects are cumulative. Although at the beginning corona is hard to detect, eventually it will develop into arcing and failure.

Using a simple dielectric structure, the diagrams show how corona develops and how it can be eliminated. Flux lines in the upper diagram illustrate how concentration at sharp corners of a conductor tend to cause very high stress at these points. If the stress is high enough, corona can develop and grow to the point where flashover must occur.

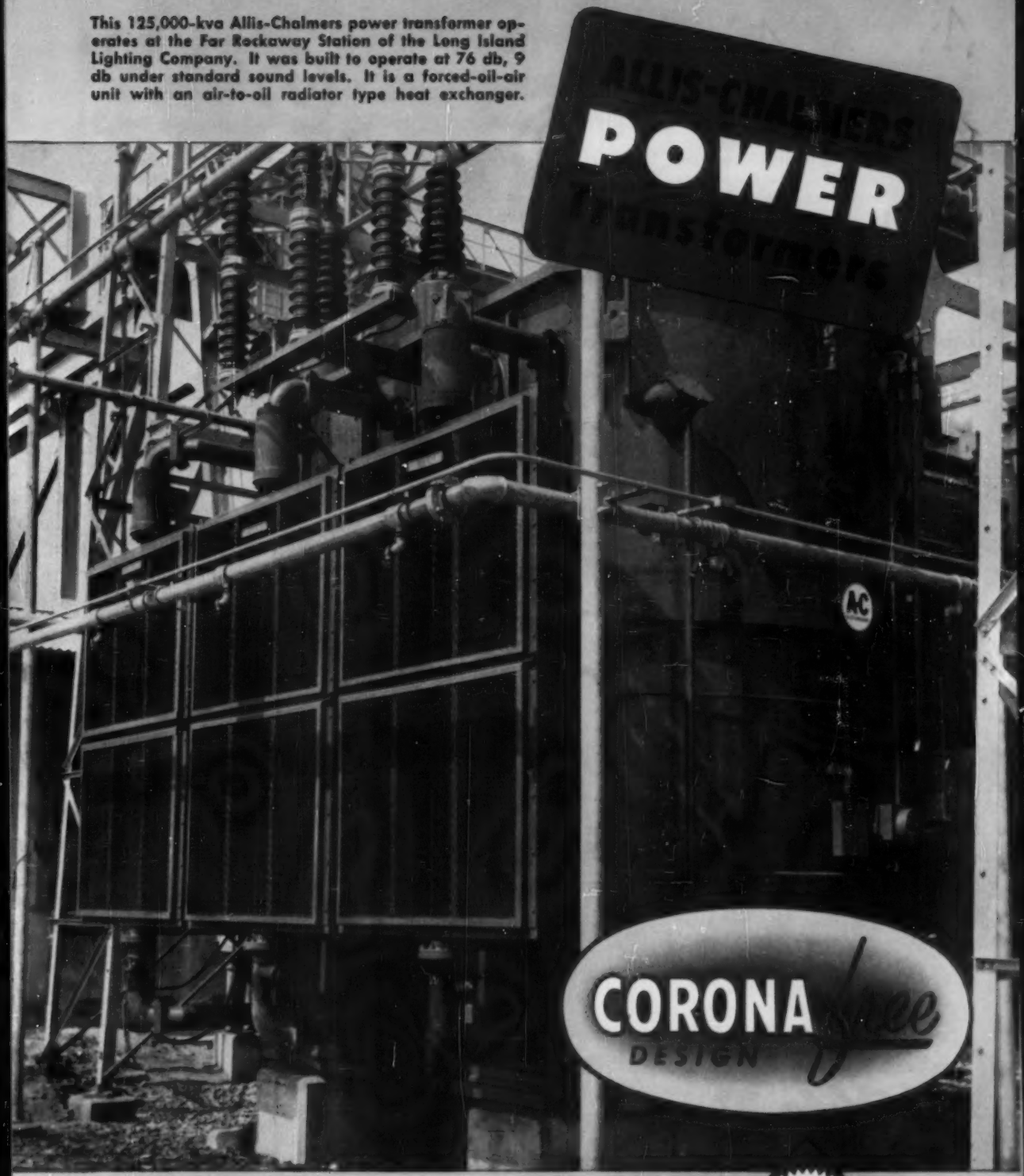
The lower diagram shows how to eliminate corona. Use of proper dimensions, correct insulation thicknesses, and modified shapes permits development of a structure in which corona cannot develop even under breakdown voltages.

Each of the thousands of points in a transformer where corona may occur is designed and tested to eliminate this possibility. Thus, Allis-Chalmers transformers earn their designation, "Corona-Free."

A-4438

ALLIS-

This 125,000-kva Allis-Chalmers power transformer operates at the Far Rockaway Station of the Long Island Lighting Company. It was built to operate at 76 db, 9 db under standard sound levels. It is a forced-oil-air unit with an air-to-oil radiator type heat exchanger.



CHALMERS

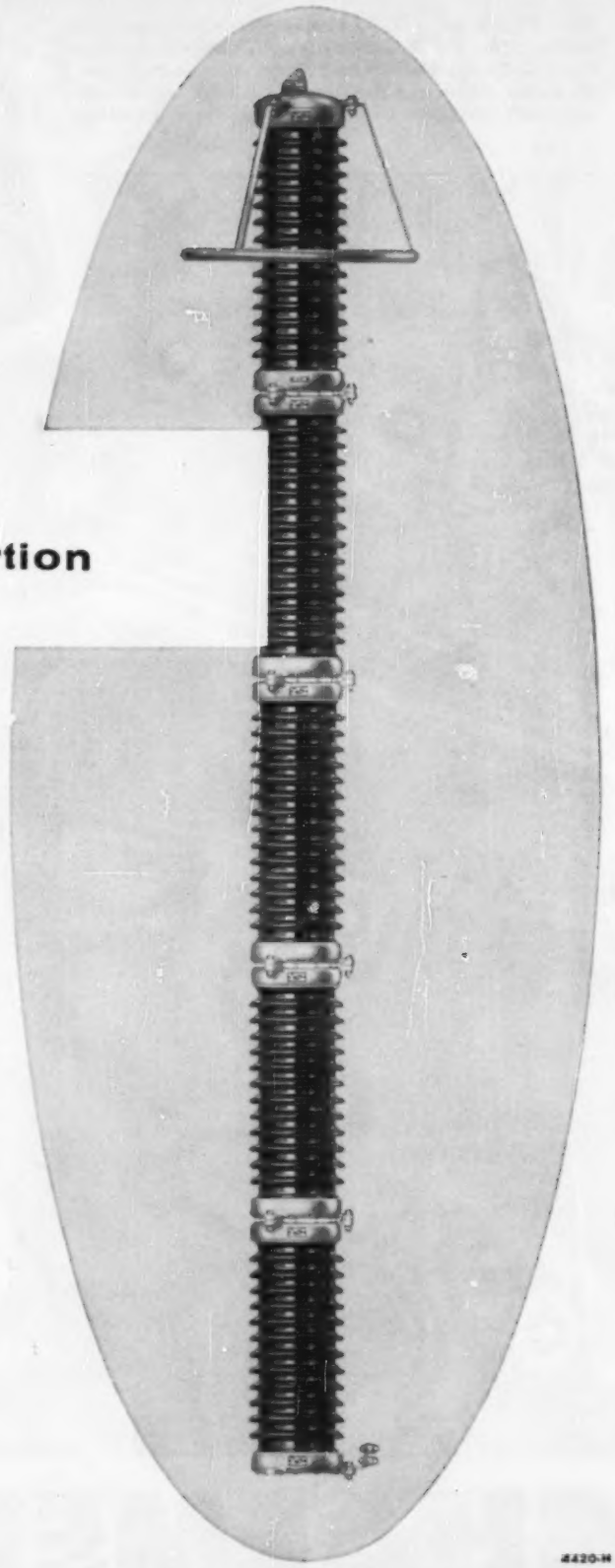
A-C ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

Self-supporting

THOREX ARRESTERS

are inherently free from voltage distortion



All Thorex lightning arresters, from the smallest to the largest, are self-supporting. Obviously, this saves the cost of design and installation of support or bracing structures and insulation. These "incidental" items can often be more expensive than the arrester units themselves.

But, there is still another important factor. Bracing or supporting insulators, connected at intermediate points in the arrester stack, offer the likelihood of electrical surface leakage under conditions of contamination and moisture. This can distort proper voltage division between units, which invites severe arrester damage.

Since the lack of intermediate insulating supports is inherent in the self-supporting Thorex arrester, you have added assurance of long-time reliability and protection -- and not at any premium, in fact, as part of a very substantial saving in installed cost.

Here is additional proof of the sound investment you make when you protect your major apparatus with Thorex lightning arresters.

Ohio Brass

MANSFIELD OHIO, U.S.A.

4420-H

Egypt Plans Large Aswan Dam

Rock-filled structure will be second largest in world and will feed power to 380-kv transmission system to span 65 miles

With the help of American and European engineers, the Egyptian government is planning a large hydroelectric project on the Nile River, comparable in size to the world's largest similar undertakings.

The High Aswan Dam (lower down the river, work is progressing on the smaller Aswan Dam project) is expected to cost $600 million and take ten years to build. When completed, it will store 110 million acre-ft of water, develop 1 million kw of power, generate 10 billion kwhr annually, and provide water to irrigate an additional 2 million acres in Egypt.

As part of the program, a 380-kv transmission system will span 650 miles to deliver power to northern Egypt for irrigation pumping, fertilizer production, and general use. The powerhouse for 16 generators will be underground.

Will Be Rock-Filled . . . The general plan for High Aswan was outlined by Dr Mohamed Selim, secretary-general of Egypt's Production Council, during a press interview recently in San Francisco. Accompanying Dr Selim were Dr Hassen Zaki, Egyptian minister of public works and technical advisor for the project, and Col Samir Helmy, a member of the production council.

High Aswan will be a rock-fill dam. Its cubage of 65 million cu yds will mark it as one of the largest dams of this type in the world, and over 20 times the size of the Great Pyramid. The central structure will be 320 ft high and 2,000 ft long at the crest, with wing dams on either side.

Unprecedented in the U. S., but a normal practice in Egypt, said Dr Selim, the foundation and base of High Aswan will be built under 120 ft of water in the storage pool of the existing dam. Underwater grouting and pontoon dumping will be two of the construction techniques employed.

Provision Made for Silting . . . Core of the dam will be Aswan clay. Because of the silting conditions in the Nile, provision is made in the reservoir to accommodate silt and still provide space for 110 million acre-ft of water, or over three times the maximum storage of Hoover Dam. Useful life of the structure is set at 500 years. Dr Zaki estimated that 10,000 men using the most modern construction equipment and machines will be needed to build the dam.

Water to run the 16 generators in the underground power house will be carried in six 50-ft diameter, 3,600-ft conversion tunnels. Initially, eight units will be installed. Ultimate capacity of the project will be almost three times Egypt's present total installed capacity of 365,000 kw. The production of 10 billion kwhr annually compares with present annual generation of 850 million kwhr.

Power will be transmitted 650 miles to Cairo at 380 kv. Present plans, Dr Selim related, call for 300,000 kw to be sent to Cairo, 220,000 kw to be used in the manufacture of fertilizer, and 100,000 kw for irrigation pumping in the Nile valley. Cost of power delivered in Cairo is estimated at 5 mills, compared with the present 11-mill cost of steam-generated power in the city. Consultation on the 380-kv transmission system is being obtained from Electricite de France.

The project will be financed with money obtained in equal part from local sources in Egypt and groups outside the country.

Dr Selim and his party, including George Chesney of the U. S. Foreign Operations Administration, held the interview after visiting the Bear River and Salt Springs Dam of Pacific Gas & Electric Co and the Cherry Valley Dam of San Francisco's Hetch Hetchy project. These dams represent the same type of rock-fill construction under consideration for Egypt. The party also visited the Bureau of Reclamation's Palisades project in Idaho.

Also at the interview was L. C. Steele, retired vice president and chief engineer of Pacific G&E, who is a consultant on the international board of consultants for High Aswan. This board includes other engineers in the United States, France and Germany.

Japan's Rainmakers at Work

United States' rainmaking success has inspired the Japanese to carry on tests for the same purpose. Tokyo Electric Power Co has placed a battery of rainmaking guns (shown above) in use at its Lake Tachiro experimental station. The scorching heat, blasting the lake surface, is supposed to raise enough water vapor "load" for the low hanging clouds to bring down rain.

General Electric Officials Elevated

F. K. McCUNE

General Electric Co has appointed three new vice presidents. They are: Francis K. McCune of Schenectady, general manager of the Atomic Products Division; Robert L. Gibson of Pittsfield, Mass., general manager of the Chemical and Metallurgical Division; and Willard H. Sahloff of Bridgeport, Conn., general manager of the Small Appliance Division.

McCune directs the company's far-flung atomic energy activities, including the Hanford Atomic Products Operation at Richland, Wash., the Knolls Atomic Power Laboratory at Schenectady, the Aircraft Nuclear Propulsion Department at Evandale, Ohio, and coordination of all GE's activities in the nuclear field with the Atomic Energy Commission. An electrical engineer, McCune joined General Electric in 1928.

As general manager of the Chemical and Metallurgical Division, Gibson has responsibility for the division's plants in six states. His departments include silicone products, plastics, chemical materials, carboloy, and laminated and insulating products. Gibson, a GE veteran, has been active in various phases of the company's public relations work. After serving as assistant to the late Robert S. Peare, then GE vice president in charge of public relations, he became in 1945 advertising and sales promotion manager of the newly formed chemical department. He served this department in various capacities before becoming general manager of the Chemical and Metallurgical Division last July.

R. L. GIBSON

W. H. SAHLOFF

Sahloff, who has wide experience in the merchandising field, has filled the general manager's post since April, 1953. Before this he was general manager of GE's radio and television department at Syracuse for three years.

General Cable's 4 New Vice Presidents

Election of four additional vice presidents has been announced by General Cable Corp. The newly elected officials are: Martin H. McGrath, vice president and chief engineer; Elliott B. McGrew, vice president and director of purchases; H. George Richardson, vice president and general sales manager; and August Wacker, vice president.

They took over their new duties on Jan. 1, 1955. McGrath, previously chief engineer, has been engaged in engineering and technical development work with General Cable since 1924. Previously director of purchases, McGrew has been in the corporation's purchasing department since 1922. Richardson, with the firm since 1916, has advanced through the sales department after serving as district manager at Chicago and New York, and then director of sales. Wacker, who joined the sales department in 1926, formerly was assistant to the president.

M. H. McGRATH E. B. McGREW H. G. RICHARDSON A. WACKER

even in
an age of speed...
sheer velocity is not
always an asset...

...in fact
there are some
instances...

...where it's
a real
liability!

take low disc speed in a meter...

Speed is definitely not an asset in the turning rate of a watt-hour meter disk.

That's why the disk in the Sangamo J2 Watthour Meter revolves at a low, low rate of speed—only 10 revolutions per minute at the nameplate rating of 15 amperes. And only 66⅔ revolutions per minute or approximately one revolution a second when the J2 is busy measuring a full load of 100 amperes. Yet the J2 has exceptionally high driving power.

This means the Sangamo J2 lasts longer and requires less maintenance than ordinary meters . . . there's less wear on all moving parts.

It means good public relations, too. Mr. Customer doesn't like to see his meter spin.

A METER WITH STRAIGHT LINE ACCURACY

UP TO 100 AMPERES

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

JM54-10

Worthington Promotions

H. C. RAMSEY

Top level management changes, effective Jan. 1, have been revealed by Worthington Corp.

These are the changes:

Hobart C. Ramsey, president, will become chairman of the board, succeeding Howard Bruce, who has been elected chairman of the executive committee. Ramsey, however, will continue as chief executive officer.

Edwin J. Schwanhausser, executive vice president and member of the board, will become president of the corporation.

E. J. SCHWANHAUSSER

Clarence E. Searle is retiring as vice chairman of the board, but will continue as a director.

Walther H. Feldmann, vice president in charge of sales for the past four years, will become executive vice president, succeeding Schwanhausser.

Thomas J. Kehoe, assistant vice president and general sales manager, replaces Feldmann.

Charles A. Butcher was appointed vice president for planning. He joined Worthington as assistant to the president in 1950.

Newly elected President Schwanhausser joined Worthington in 1915. He was elected to the board of directors in 1942, becoming executive vice president in 1949.

Since joining Worthington in 1920, Ramsey has held executive positions in sales, engineering, and manufacturing. He was made president of the firm in 1949.

Brandt Gets New Duties

R. BRANDT

Robert Brandt, vice president of New England Power Co, has been assigned the duties of William R. Bell, who has retired from a vice presidency with the Boston utility. Bell's retirement ends a 42-year career with the system. Brandt is former director of Defense Electric Power Administration's Power Supply Division. Bell has been a principal officer of New England Power, a New England Electric System subsidiary, since 1952.

R. E. CARGILL

Gulf States Utilities' Changes

R. W. SHERWOOD

Appointment of R. E. Cargill to the post of operations and engineering manager and promotion of R. W. Sherwood to engineering superintendent has been disclosed by Gulf States Utilities Co. The appointments were made as the result of the recent death of Aubrey E. Beattie, former engineering manager (EW, Dec. 13, p 242). Cargill was formerly operations manager and Sherwood superintendent of planning.

OBITUARY

Edward Gushee, Detroit Edison VP

Edward T. Gushee, 59, vice president of Detroit Edison Co, died December 15 at Detroit, Mich. He was in charge of the legal, rights-of-way, and public information department.

Gushee, who joined Detroit Edison in 1920, served in various capacities before becoming a vice president in 1935. In 1939 he became executive vice president and a director of Union Electric Co of Missouri. In 1942, he returned to Detroit Edison as assistant to the president, and was reelected a vice president in 1948.

No loose connections . . . greater safety for linemen with the *NEW* LOCKED LOW VOLTAGE BUSHING . . .

on Wagner Form W Distribution Transformers

Here's just one of the many important extra features that you get when you buy Wagner Pole Type Distribution Transformers. Wagner's *new* locked low voltage bushing on Form W Transformers is key-locked to prevent rotation. A projecting key in the tank opening fits in a groove on the porcelain. The terminal is locked to the porcelain in a similar manner so it is impossible for the bushing assembly to slip or turn when the terminal is being tightened or loosened.

This means . . .

1. No loose connections on the inner end of the terminal studs because it is impossible for these studs to turn when the terminals are being tightened.
2. Greater safety for the lineman when connections are being made to the terminal.

Wagner Form W Transformers have these ADDITIONAL FEATURES . . .

SHUR-SEAL COVER — INHIBITED OIL

Form W Transformers come with the Wagner Shur-Seal Cover and are filled with an *inhibited oil*. The Shur-Seal Cover makes a *positive* seal which prevents oil contamination caused by "breathing" of atmospheric moisture and dust particles. The inhibited oil reduces oxidation to a minimum and retards the formation of acids and sludge which cause rapid transformer deterioration. Together, these features add years to the life of Wagner Form W Transformers.

NOW SHIPPED TO YOU IN DRUMS

Wagner Form W Distribution Transformers from 3 to 10 kva are now packed in sturdy fiber drums for ease of shipping, handling and storage. Each drum is sealed so that when it is opened, the transformer is as clean and free of harmful foreign particles and grease as the day it left the Wagner plant.

Write for your copy of Bulletin TU-180. It gives complete information on Wagner Distribution Transformers.

WAGNER ELECTRIC CORPORATION
6456 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS
TRANSFORMERS
INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

TSS-7

Residential Load Will Equal Industrial Load

1954

Here's the most economical way

Use G-E Unit Substations to reduce system investment

Add capacity to handle your steadily growing residential market and do it the most economical way with G-E Unit Substations.

No excess investment is needed because you buy no more capacity than is actually required. That means economy today—plus quick and easy expansion to meet the demands of tomorrow.

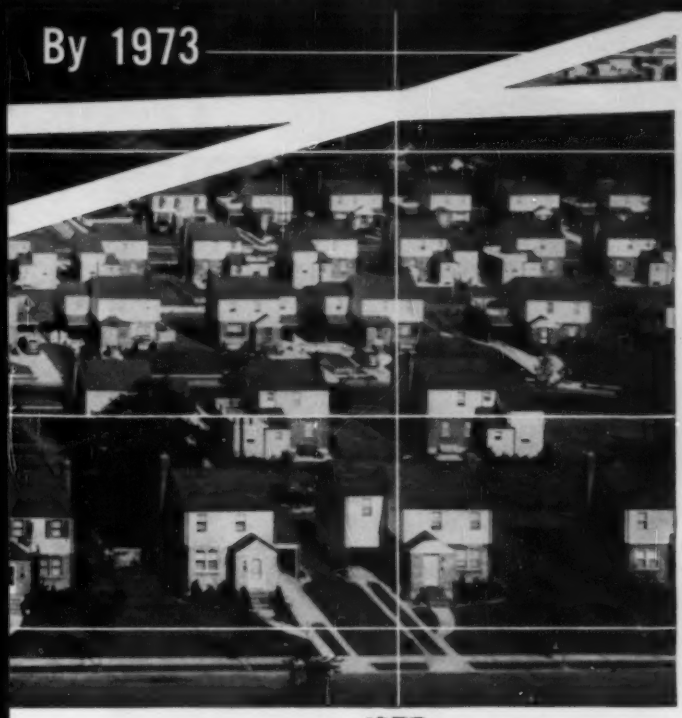
G-E Unit Substations can simplify the problems of expansion as requirements increase. Advance planning and proper substation selection, for example, permit you to expand a radial system into a network system.

Have capacity available when you need it by ordering G-E Unit Substations in advance on the basis of predicted load growth. Then, when your load grows, select sites where capacity is needed and your substations are ready to be installed.

"How to Reduce System Investment" (Bulletin GEA-5847) will help you plan for economical system expansion. It discusses system planning and reveals how other utilities are handling rapidly growing loads. For your copy, write General Electric Company, Section 512-3, Schenectady 5, N. Y.

Progress Is Our Most Important Product

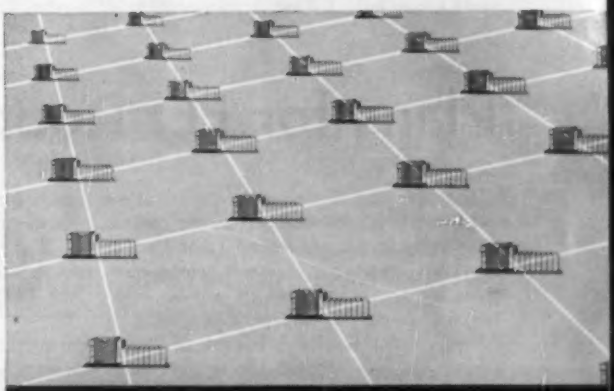
GENERAL ELECTRIC

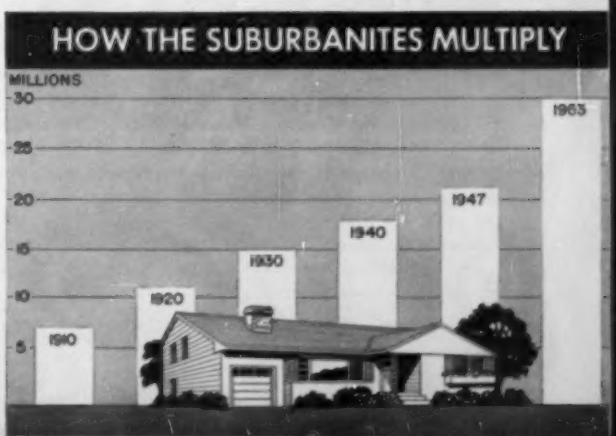


RESIDENTIAL LOAD IS GROWING rapidly, and is expected to equal industrial load by 1973. Utilities can meet their residential distribution demands yet trim system investment by advance planning with G-E Unit Substations.

to grow with your residential load

LOCATIONS FOR UNIT SUBSTATIONS are "on the mile every mile" to economically serve residential areas. By properly locating small unit substations for expansion into such a system, utilities can economically grow with increasing demands and provide residential customers with economical power and maximum service continuity.





POPULATION GROWTH in the U.S. since 1947 has been 11%—population in the suburbs has grown 43%. Since 1941 the average kilowatt-hours use per residential customer has doubled every 10 years and is expected to double again in the next decade. This fast-growing suburban growth trend has been going on for a long time—is expected to last indefinitely.

Working on the EEI's Round-Table Conference are: (sitting l to r) Howard Senyard, Louisiana P&L; C. Herald Campbell, Pacific P&L; K. K. Allen, Southern California Edison; Thomas G. Ayers, Commonwealth Edison; James E. Kane, Jr, representing J. W. Carothers, Consolidated Gas of Baltimore; Donald A. Bartlett, Western Massachusetts Electric; (standing l to r) J. S. Gracy, Florida Power; Edward S. Evans, EEI; Fred R. Rauch, Cincinnati G&E, and John Arnell, Consolidated Edison of New York.

Plans for EEI Round-Table Conference

The Industrial Relations Committee of the Edison Electric Institute approved at its meeting on Dec. 17 the plans for the Ninth Annual Round-Table Conference. Thomas G. Ayers, chairman of the subcommittee, drew up the plans for the meeting which will be held at the Drake Hotel, Chicago, Ill., on Sept. 19-21, 1955.

Ayers, who is vice president of the Commonwealth Edison Co, was assisted by the following subcommittee members: J. S. Gracy, vice president, Florida Power Corp; W. H. Senyard, director of personnel, Louisiana Power & Light Co; K. K. Allen, manager of industrial relations, Southern California Edison Co; J. W. Carothers, manager of personnel department, Consolidated Gas Electric Light & Power Co of Baltimore, and C. Herald Campbell, personnel director, Pacific Power & Light Co.

The over-all theme of the conference, Ayers said, will be "Reaping the Profits of Good Personnel Administration." The subcommittee feels that as a "service department", the industrial relations department must make definite, and in some areas, measurable contributions to the efficiency and profit of the enterprise.

With this thought in mind, the subcommittee tentatively has selected the four principle topics for the Annual Round-Table Conference, Ayers said. They are as follows:

1. Living Under the Union Contract.
2. More Productive Utilization of Manpower.
3. An Effectvie Communications Program.
4. A Look at Employee Services.

As has been the procedure in past years, these four topics will be presented to the conference by outstanding electric utility industrial relations executives. These men will, as on previous occasions, present the principles and background of these four topics against which those in attendance will discuss in the small "How To Do It" conferences their own programs.

Among the features in this year's conference, Ayers declared, will be the "Printed Material Exhibit," which will display pamphlets, booklets, etc, pertinent to personnel administration in the electric utility field and on the whole field of personnel. A demonstration of the role of "playing technique" will be presented, the details of which have not as yet been worked out, the Commonwealth Edison executive said.

The announcement of the names of the four keynote speakers will be made in the near future as soon as acceptances have been received, Ayers concluded in his statement.

Underground incoming cables enter the unit on the right. The center unit serves air-conditioning equipment, and the left unit feeds the transformer seen alongside.

MR. GLENN SHUTTS of White City Electric Co., Chicago, has recommended many installations of S&C Metalclad Switchgear, including the one at G. D. Searle & Co. He says, "S&C gear does the job at a considerable saving over other types. From a service angle it has been perfect . . . we have never had to go back . . . there has been no maintenance . . . no trouble whatsoever. All of our customers are absolutely satisfied. As a result S&C has received many repeat orders."

You can cut the cost of your high-voltage supply system

SAVE UP TO 50% WITH S&C METALCLAD SWITCHGEAR

The installation pictured above—at G. D. Searle & Co., Skokie, Illinois—is another instance of S&C Metalclad Switchgear engineered to reduce the capital outlay for the construction of the electrical supply system.

At low cost—considerably lower than other types of switchgear—S&C equipment provides means for switching and protecting the high-voltage circuits. Its dependability is attested by the scores of successful installations now in service.

S&C field engineers will gladly work with you in reducing your high-voltage equipment costs . . . just pick up the telephone.

Specialists in High-Voltage Switchgear for Electric Utilities since 1910

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Consult your telephone directory. Sales offices located in Birmingham, Boston, Buffalo, Chicago, Clayton (St. Louis), Cleveland, Dallas, Dearborn (Detroit), Denver, Houston, Huntington, Indianapolis, Jersey City, Kansas City, Little Rock, Memphis, Minneapolis, New Orleans, Philadelphia, Pittsburgh, Portland (Ore.), St. Petersburg, Salt Lake City, San Francisco, San Gabriel (Los Angeles), Seattle, Syracuse, Washington, D. C.

At Harwell in Preparation for Nuclear Power . . .

Britain Trains Atomic Technicians

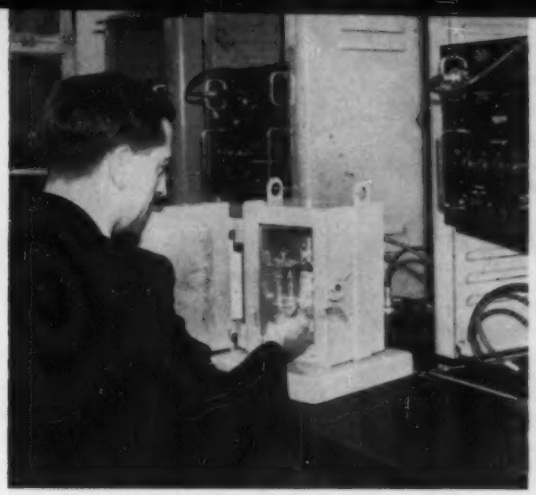
The British government has taken steps to ensure that industry will have enough trained technicians to cope with atomic power reactors as they come on the line.

Recently Britain's atomic energy controlling body, the Atomic Energy Authority, opened the Reactor School at Harwell. Although it has been established by the government, it has been set up to train staffs from industrial concerns in the techniques of converting heat from atomic piles into useful power.

Addressing the first class of 33 engineers and industrialists, Sir John Cockcroft, director of the Atomic Energy Research Establishment, said:

"Our main objective is to enable British industry to design and build economic power units as early as possible since there is a general belief that we will need quite sizeable additions to our normal electrical output from nuclear sources in the 1960's." British industry is to be given the benefit of the experience gained in building the first two nuclear power stations at Calder Hall, Cumberland. The prospect is that these large atomic power stations projected for 1960 will be capable of generating electricity for industry which, today, would need two million tons of coal a year.

The Reactor School will provide three courses a year at a fee (excluding accomodation) of about $700. Courses of training last three months. The syllabus includes lectures and individual instruction in nuclear and reactor physics, metallurgy, and reactor engineering, as well as



INSTRUCTOR demonstrates lead-encased apparatus which contains Geiger counter to measure radioactivity of various sources.

STUDENT, aided by instructor, learns how to evaluate absorption capacity of various materials. Lead castle at left contains "source."

HOW to handle powerful "neutron source" is shown over water tank and concrete shield

SIR JOHN COCKCROFT, standing, director of Atomic Energy Research Establishment, addressed first class of 33 engineers and industrialists at Reactor School's recent opening

experimental work. In theory each student should return to his firm at the end of the course armed with basic knowledge necessary for designing an atomic power unit.

All students will be expected to be graduates in physics or engineering or else to have had considerable theoretical and practical experience in at least one branch of science or engineering. Mathematics up to a subsidiary degree standard is necessary, particularly for the lectures in reactor physics.

Priority will be given at first to staffs of firms already acting as contractors to the Atomic Energy Authority. But applicants from other industrial concerns will have plenty of opportunity to train at the new school as there will be three sessions. Lectures will be given by experts drawn from various divisions at Harwell and by a full-time school staff.

Establishment of the School is a sequel to the policy outlined in Parliament during the debate on the Atomic Energy Authority. It was emphasized then that one of the tasks of AEA would be to increase industrial participation in the atomic energy project. For this purpose staffs from industry must be trained.

Britain's anticipated nuclear power progress has been stated by Sir John. The first two nuclear power stations, at Calder Hill, are known as "Mark I stations" and are providing initial experience.

"I envisage," says Sir John, "a development period of eight years, during which we shall have built and operated Mark I power stations for five or six years, and designed and built improved Mark II stations and possibly Mark III stations of a different type.

"We should then be in a position to build nuclear power units on a scale adequate to do the job of 20 million tons of coal a year, and I think this could easily be achieved between 1965 and 1970—perhaps earlier if the need were great."

Faced with an increasing coal shortage, Britain is pushing nuclear power development to solve this problem.

MIKE THE MOLE SAYS:

Give the GUY a CHANCE

I get around... and I know that Chance Anchors really hold

YOU GET THE MOST FOR YOUR MONEY WITH CHANCE ANCHORS the most complete line

8-WAY EXPANDING

The guy load is distributed all around the anchor—no wasted space between blades. Usually installed in clay or loam.

NO-WRENCH SCREW

For hand or machine installation. Pitch-controlled blade goes down faster and adds to holding power in sandy soil, soft clay or loam.

NEVER-CREEP

Made of structural steel. Pulls entirely against solid, undisturbed earth. For extra heavy loads in clay or loam.

CROSS-PLATE

For heavy-duty anchoring in machine-bored holes. Holds better than logs or slugs. Saves time and money.

SWAMP SCREW

For swamps, marshes, quicksand, river crossings or seasonally flooded areas. Screws down deeply by adding sections of pipe.

8-WAY CONE

Acts as inverted wedge. Flaring base and flat faces increase wedging action. Used in rocky areas with rock wedging.

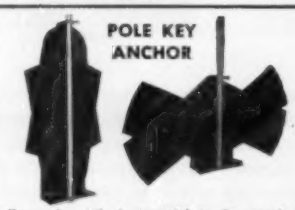
EXPANDING ROCK

No grouting necessary. The greater the pull, the tighter it wedges against solid rock. Set in 2" drilled hole.

WRENCH TYPE SCREW

All steel—double arc welded. Anchor hub absorbs installation strain. For light loads in sandy soil, soft clay or loam.

POLE KEY ANCHOR



Keys poles at the butt to reinforce them against unbalanced loads in soft soil. Ideal for congested urban areas.

Both the soil type and condition are important factors in determining the type of installation and the kind of anchors to use. That's why Chance Anchors are made in so many types and sizes. The anchors shown above are made in a wide variety of sizes. Each type is designed for certain soil and guying conditions. Each of these anchors will do its specific job better than any other anchor you can choose.

Protect your investment in line construction. Analyze your soil and guying conditions, and specify the Chance Anchors that meet your particular requirements.

There is a CHANCE Anchor Distributor in your area who can probably fill your order directly from stock.

Specify* CHANCE *for Service!

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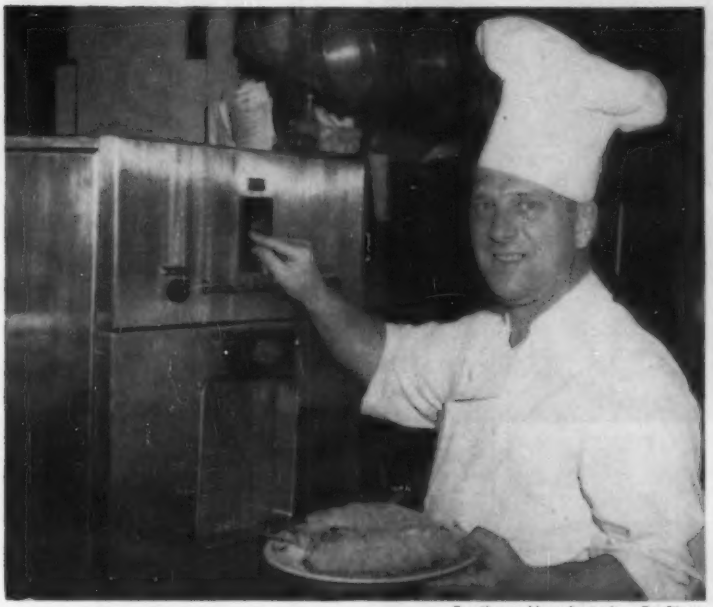
CASA-2



Raytheon Manufacturing Co Photo

ELECTRONIC COOKING UNIT is called indispensable by Charley Sperling, head chef at Rex Grille, Lowell, Mass. It can roast an 18-lb beef in 40 min, bake a potato in only 2.5 min

Electronic Cooking Hot Stuff

Massachusetts restauranteur's unit uses from one to five kw. "Would be lost without it," he testifies

"Microwave cooking has paid for itself in my restaurant in less than 18 months," reports Charles Dancause, owner of the Rex Grille in Lowell, Mass.

Dancause says cooking electronically permits him to serve a wider variety of foods, faster, easier and with less waste. Now he can prepare and pre-portion many items during off-peak periods in mid-morning and afternoon, refrigerate them and then bring them back to serving temperatures in, as he says, "nothing flat." His microwave oven bakes a potato in 2.5 min, reheats refrigerated meat pies in 45 sec, gives a "shot" to a frozen lamb chop in 2 min. If needed quickly an 18-lb, 7-rib beef can be roasted in 40 min.

Electronic cooking works on an entirely different idea than do conventional methods of cooking. Since Man first learned to use fire, food has been cooked by applying heat to the surface. The interior is cooked by the process of conduction. In an electronic oven, high frequency radio energy (microwaves) penetrates the food to a depth of about 2½ in. As it penetrates, it sets up molecular friction deep within the food, which in turn creates heat. The oven is not heated. Only heat present is in the food itself.

Dancause finds his microwave cooking is particularly useful in his short order and "meal in a package" carryout service. It supplements the steam table and other ovens, and speeds turnover of patrons. Since he can now pre-prepare foods for later reheating, customers who arrive in groups and then order items having different preparation times can be served simultaneously on short order.

Mashed potatoes, ordinarily less palatable after two hr on the steam table now are prepared to last several days. Steak, pork chops and lamb chops are kept frozen and when ordered are popped into the microwave oven for about 1 min. Broiled chicken is cooked until ¾ done electronically and finished in the broiler. Conversely, in roasting it is placed in the regular oven until ¾ done, refrigerated and then heated to order in the microwave unit.

Costly and troublesome leftovers from banquets are no longer a problem. They are easily reheated by microwaves without loss of original quality. The unit, in effect, compliments the Rex Grille's conventional cooking equipment.

It's helped Dancause out of some tight spots. "Quite frequently," he says, "a group will arrive with well over the number of people for which I had planned. When this happens I just heat enough extra food in the electronic oven to carry me through while they have their cocktails. Only the other day this happened. I defrosted and cooked an 8-lb roast and had it ready on time."

Dancause says he would be lost without it. He estimates it has reduced overall food costs at least 10% by cutting waste, affording better portion control and improving the restaurant's ability to meet unexpected demands. It makes for greater flexibility and increases labor efficiency. He finds some 25 to 30% more business can be handled with same staff.

How Oven Works

Electronic cooking unit at the Rex Grille is a product of Raytheon Manufacturing Co. It operates on 208 v, single phase. Heating chamber measures 20x12x22 in. It consumes about one kw on standby and about five kw on the high heat, with a power factor of approximately 85%. Power demand for a smaller counter model which the company makes is just about half that of the larger unit. Heating is accomplished by "microwave" energy at 2450 megacycles, generated by continuous-wave, air-cooled magnetrons. Dancause's oven averages from 1½ to two hr per day in cooking and reheating time.

Frankfort turns on largest fluorescent system where . . .

General Electric Co Photos

Colder Weather Improves Light Output

As temperatures go down, light output goes up with this new fluorescent street lighting system—the largest installed in the country to date. Before and after scenes above are in Frankfort, Ind. where 18 blocks of fluorescent lights were turned on last fall as first step in a city industrial development program.

Manufacturer claims the new-type units improve their light output as the weather gets colder, reaching a max of 140% of normal output at 0 deg F. Since Frankfort's average evening temperature is about 55 F, engineers figure the units will produce more than their rated output most of the time. This means each unit consuming 400 w could produce illumination equivalent to a 1000-w incandescent lamp. Plastic globes enclose the lamps which are mounted on 30-ft steel poles. Footcandle level is graduated from 1 ft-c on the fringes of the business district to 3 ft-c at courthouse square in town's center.

There are a total of 206 units in the system. Paid for by the city, it replaces old "whiteway" built in 1916. Each luminaire holds four 6-ft fluorescent lamps. City fathers chose fluorescent units because they wanted a type "which would be good for 25 or 30 years."

Rural Power Use Needs Teamwork Group Told

Progress in farm electrification is the product of teamwork between the electric utility, electrical manufacturers, fore-sighted farmers, educators and leaders of such movements as 4-H clubs.

Such were the words of H. P. Sedwick, executive vice president of Commonwealth Edison Co at the annual Power Supplier Conference held last month in Chicago. Sedwick told the group that the utilization of farm electricity is a flourishing field, whose future is limited only by the ingenuity of the farmer and his partners in progress.

Scholarships of $300 each were presented to six youths at the 4-H Club Congress held in conjunction with the power supplier meeting. They were named winners of the national 4-H Farm and Home Electric Competition sponsored annually by Westinghouse Electric Corp.

Power supplier meeting was aimed at showing utilities how they can better cooperate with such farm programs as 4-H.

"Write Ticket" Contest Writes Range Sales

At least a 50% increase in electric range sales is reported for a "Write Your Own Ticket" contest sponsored by Southwestern Public Service Co, Amarillo, Tex.

"With 630 sales reported so far in the two-month campaign, the total may reach 750 when all salesmen turn in their results," said Andrew Coolidge, Public Service residential and commercial sales manager. Average range sales ran about 200 per month before the contest. It offered New Years Day bowl game tickets to six dealer salesmen in Southwestern's area who sold the most electric ranges in October and November. Winners and their wives also received airline transportation and $75 expense money. Each contestant had to sell at least six ranges to qualify.

Attesting to the fact that sales effort and proper inducement will sell ranges, Coolidge pointed out that first, third and fifth place winners, working in two towns of 10,000 people and less, sold a total 87 ranges.

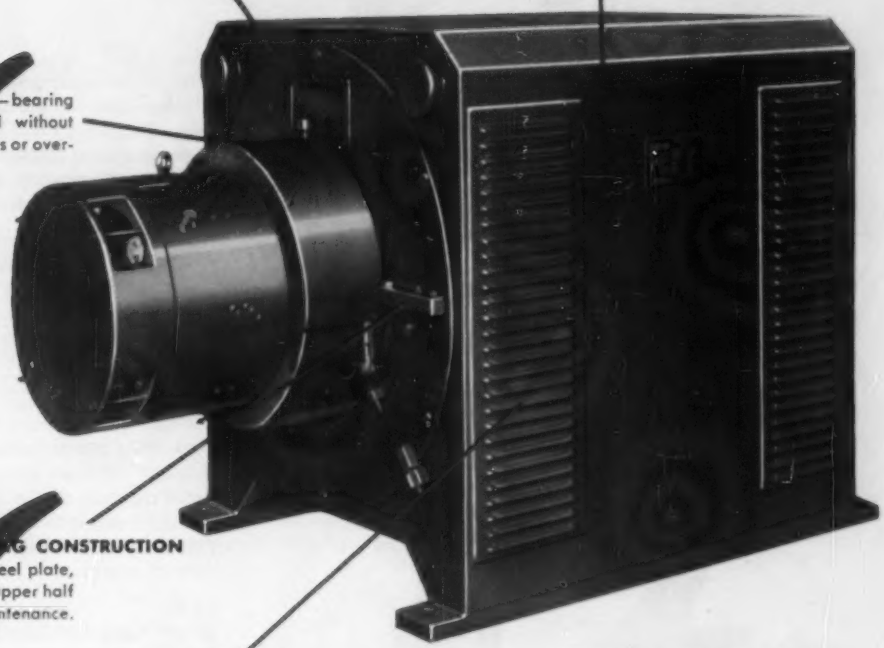
Check the advanced features

of the new ELLIOTT Synchronous Motor

FOR EA[illegible] INSPE[illegible]ON and maintena[illegible] of C[illegible]ctor Rings. Rectangul[illegible] with removable, tran[illegible] over in upper half of bea[illegible]acket.

GREATER PROTECT[illegible] is provided [illegible]s truly [illegible]roof motor which [illegible]exce[illegible]the standard dripproo[illegible] for keeping moisture [illegible] away from the electrical p[illegible]

BETTER ACCESSIBIL[illegible]—bearing sleeve[illegible] be [illegible]ved without disturbi[illegible]ar[illegible]ackets or overhung exc[illegible]



RIGID B[illegible]KET BE[illegible]G CONSTRUCTION Brackets, [illegible]m [illegible]steel plate, are split ho[illegible]nd upper half is removable[illegible]y maintenance.

IMPRO[illegible] VENTIL[illegible]ON with louvered [illegible]ning[illegible]o on each side, for [illegible]ir discharged out botto[illegible]r, between feet at both end[illegible]

• It's another step forward for Elliott Synchronous Motors. Note the new rectangular frame and bracket bearing construction. You can see at a glance how much has been done to improve appearance, strength, and operating performance and to simplify handling and maintenance. It's one more example of Elliott Synchronous Motor leadership. Contact your local Elliott Field Engineer for details or write the Elliott Company, Ridgway Division, Ridgway, Pa.

ELLIOTT Company

RS-6

TURBINE-GENERATORS TURBINES MOTORS GENERATORS DEAERATING HEATERS EJECTORS CONDENSERS COMPRESSORS TURBOCHARGERS TUBE CLEANERS STRAINERS

With the foresight that has become an acknowledged standard of the industry, America's electric utilities placed 12,000,000 kilowatts of new generating capacity on the line during 1954—a 12 per cent increase that marks the biggest single year of expansion in history.

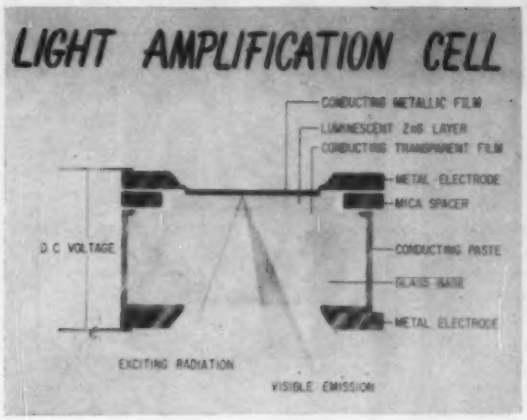
An effort of these proportions is the strongest possible indication that the nation's electric companies are not only aware of this country's tremendous growth potential, but are taking every practical step to insure that America's industries and America's families will always have on tap an abundant supply of essential electric power.

And it is a tribute to these companies that not only did they put this record-breaking, additional capacity on the line, but simultaneously instituted major technological advances to further reduce the cost of producing each kilowatt of energy.

Of this 12,000,000 kilowatts added in 1954, almost **6,000,000 kilowatts are being generated with about 45,000,000 pounds of steam supplied by 60 B&W Boilers.** Many of these B&W units—some of which are as big as a 20-story building—have been designed to utilize such significant engineering advances as Pressure-Firing, Gas Recirculation, Divided Furnace Construction, the Cyclone Furnace, Reheat and Cyclone Steam Separators.

As a major supplier, B&W plays a vital role—with the individual electric companies and their engineers—in the development of the nation's greatest source of strength. And it is through the continuing cooperative engineering efforts of the utilities and their suppliers, that America's voracious appetite for low-cost power will always be satisfied.

N-194



EXPERIMENTAL LIGHT AMPLIFIER provides a zinc-sulfide screen for a lantern slide projected (from left) with ultraviolet light

AMPLIFICATION OCCURS when photons strike zinc-sulfide layer. Freed electrons dart to positive metallic film, causing phosphor to glow

GE Develops Electric Light Amplifier

An electric light-amplifier that can give off 10 times more light than the amount hitting its screen has been created by scientists at General Electric's Research Laboratory, Schenectady, N. Y. They predict that higher amplifications may be achieved eventually.

Believed to be the first to amplify light without vacuum tubes, the experimental device is considered a "fundamental new phenomenon," said Dr. C. G. Suits, GE vice-president and director of research. Its future applications are so distant as to be speculative now. But, he said, the light amplifier may yield a "clue" to picture-on-the-wall television. It also may be useful in x-ray fluoroscopy, photography, and for "seeing in the dark" devices.

The amplifier consists of a thin film of zinc sulfide phosphor sandwiched between a sheet of conducting glass and a metal backing plate. A dc voltage is applied across glass and metal plate. This creates an electrostatic field needed to make the device work.

When a picture is projected with ultraviolet light upon this "electric screen," the photons strike the phosphor. They jar loose many electrons that dart to the positive plate. These electrons excite manganese impurities in the phosphor, causing the screen to glow brilliantly in orangish-yellow hues. The color of the picture varies with the impurity in the zinc sulfide.

D. A. Cusano, left, GE scientist, developed the device after Dr. F. E. Williams said it might be done. Dr. Williams, who heads the laboratory's light generation studies, based his prediction upon theoretical studies he had in progress four years ago.

The present amplifier has only a 4-in. screen, but the size of future screens is limited only by the intricate vacuum process used in depositing the phosphor coating on the glass. Since the needed dc potential is a function of the phosphor film's thickness, it is possible to have a huge screen operating on a 100-v power supply.

New Microwave to Operate In 2,450-2,700-mc Band

Radio Corp of America has announced the first microwave radio system designed to operate in the unused 2,450-2,700-mc band of the microwave spectrum. Providing up to 30 voice channels, the new system was designed to meet requirements of utilities, pipeline operations, railroads, turnpikes, and commercial carriers.

The new system will permit establishment of new microwave stations in areas already "closed" or crowded. Having approximately half the spectrum requirements of most other systems, it will permit a greater concentration of stations in a given region than has been possible. This RCA MM-26 system uses conventional triode tubes and standard circuitry.

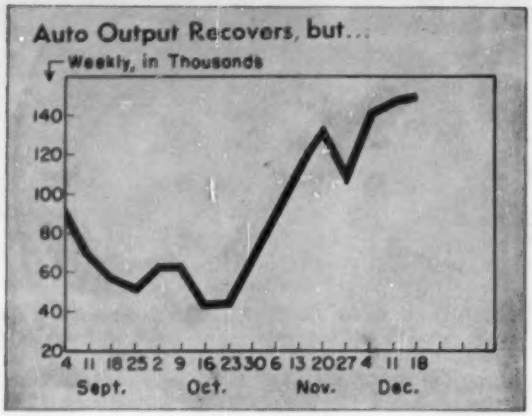
MANUFACTURING BRIEFS

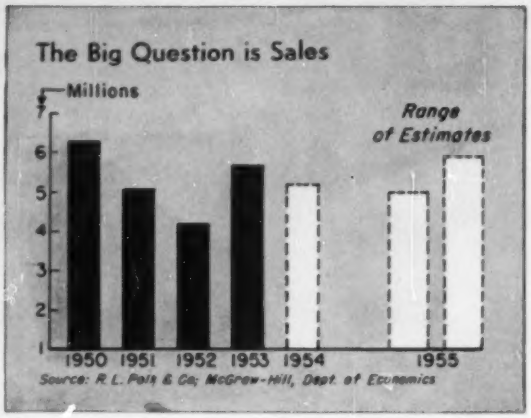
ACEC Electric Corp is the new name of the former Belgian Electric Sales Corp, whose main offices are located at 40 East 49th Street, New York, N. Y. Under the company's new policy, the ACEC line will include large-horsepower as well as single-phase motors, and the service organization is being expanded to service squirrel-cage, wound-rotor and synchronous motors up to 70,000 hp.

Westinghouse Lamp Division of Westinghouse Electric Corp has a 750-w, type T-20 lamp interchangeable between 6- and 8-in. Fresnel lighting units, has 200-hr life, can be operated from "base down" to "horizontal" position. . . . Plans have been announced for a new jet engine research and development laboratory costing more than $2.5 million, to be located at the present site of the jet engine plant south of Kansas City, Mo.

Synthetic Mica Corp, a subsidiary of Mycalex Corp of America, is expected to start operation early this year in a new plant in Caldwell, N. J. This plant is believed to be the world's first synthetic mica plant.

ELECTRICAL BUSINESS OUTLOOK





Auto Output: Key To 1955 Business

Now that business is clearly coming out of the recent recession, the big question is "How far and how fast?" A crucial part of the answer is going to be provided by the big and now booming automobile industry.

What happens to auto sales always is important to other business—including electric utilities. Automobiles account for a large share of consumer buying and short-term borrowing, as well as a big share of production of steel, glass, rubber and the other materials that go into them. Literally millions of workers prosper when the auto industry prospers, and go on shorter hours or are laid off when autos slump.

And this year, some special factors combine to make what happens to autos even more important than usual. It may be the auto industry, along with a couple of other big industries, that sets the pattern for 1955—whether it is steady growth, real boom, or a flash boom followed by another drop in production.

Auto Production Hits Stride . . . The auto industry is back in production with a vengeance (chart) after a long slowdown in late summer and fall. During the period of low production, inventories were reduced and plants changed over to turn out the sharply re-designed models.

By mid-December, production had recovered to the highest point since April, 1953—one of the biggest years in the industry. The steel industry, riding the upturn in demand from auto makers, has snapped back from operation at about 60 per cent of capacity to more than 80 per cent. And the other industries that supply the automotive giants have had the same sort of experience.

Now the big question is—can autos hold the pace? Producers have been rushing to build up dealers' stocks of new cars, and also rushing to meet the large number of sales that have been attracted by the redesigned qualities of the new models. But, unless sales are unusually high, producers will have to cut back production in a month or two or see inventories rise out of all normal proportions.

So far, sales have been excellent. The statistics are not up to date, but dealers are reported doing far more business than is normal at this time of year. If sales stay good, producers will be able to hold production high for several months—right up to the usual period of high production in the spring.

Strike Threat Poses Problem . . . But there's another problem lurking on the horizon—the possibility of one or more strikes in the auto industry this spring. And this fact raises two somewhat dangerous possibilities:

1. There may be a strike. And that would not only hit the auto producers hard; it would also hurt all those industries that depend on autos as buyers of their products.

2. Or—there may be no strike. And strangely enough, that could cause almost as much trouble as a strike. The reason is that Detroit will probably try to build up big stocks of finished cars in anticipation of a possible strike. If the strike does not come, inventories will be so large that the auto producers might still have to cut back production. And that would hurt other industries.

So either way—strike or no strike—there's a chance of overproduction in the auto industry. And this overproduction could lead to overoptimism in steel, glass and other related industries, causing them to produce too much and build up their own inventories.

In this situation, automobile sales become a critical factor in the business outlook for this year. So far, as mentioned earlier, sales of the new models have been excellent. But earlier estimates for car sales in 1955 were not remarkably high—around 5.2 million new cars.

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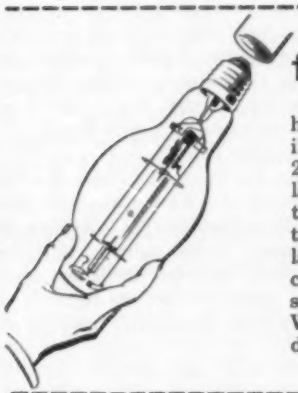
for the home...

high-wattage Sylvania bulbs now offer your residential customers more light per dollar than ever before. Sylvania's 150-watt Bolite, 200-watt All-Purpose Lite, 150-watt Reading Lite and Kitchen Lite are changing the public's thinking on lighting in the home. When you think of better light for the home, think first of Sylvania.



for industry...

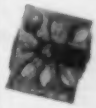
here's today's biggest bargain in light for industry—Sylvania's new 400-watt, 20,000 lumen E-H1 mercury vapor lamp. Where color-correction is important Sylvania offers a similar bargain in the 18,000 lumen, J-H1 "golden white" lamp. This wide range of Sylvania mercury vapor types is geared to help you sell better light to any manufacturer. When you think of better sight for industry, think of Sylvania first.

for the farm...

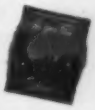
Sylvania's outdoor and indoor reflector lamps are opening up a new era in high-efficiency lighting—low-cost installation. When you think of more efficiency for the American farmer, think of Sylvania first.

YOU'LL WANT THESE BOOKLETS

"HOME LIGHTING NEWS" FOLDER. Suggesting light bulbs that will do a "special" job in the home.



"MORE LIGHT FOR LESS MONEY"— Sylvania mercury vapor lamps



"SYLVANIA FARM LIGHTING" BOOKLET

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IN THE INDUSTRY

Court Decision Could Increase Power-Line Costs

A recent decision by the Mississippi Supreme Court might add another expensive item to the cost of power-line construction. Even if the effect is confined solely to Mississippi, the controlling opinion of the high state court still affords a line of reasoning that could worry utility lawyers for some time to come.

Gist of the court ruling is this: An electric utility is liable to adjacent property owners for damages resulting from the presence of a power line along the highway right-of-way (EW, Dec. 13, p 96).

An Additional Servitude . . . The 5-man court majority held that a power line constitutes a servitude in addition to that envisioned when the property was conveyed to the state for highway purposes, and the property owner is entitled to compensation for damages resulting from this additional servitude. Claimed damages in the case at bar, which are still to be adjudicated by a lower court, amount to $2,000 on property that has been assessed at $12,000.

Petition for reconsideration of this ruling is certain to be filed, but the basis for the petition has not been finally determined.

Utility lawyers in the state indicate that the ruling may affect many hundreds of miles of power lines, gas and oil pipelines, and other utility carriers that have been constructed in the state during the past ten years. There is a ten-year statute of limitations beyond which the ruling would not apply. Another statute provides for a two-year limit on the filing of damage suits, but legal experts are not sure it would apply in this case.

If followed by the courts in other states, the Mississippi ruling might create liabilities reaching into the millions.

The Mississippi court did not officially comment on the claimed damages, but these were described in the suit before the lower court. It was claimed that the power line would interfere with television reception in the immediate area and further that the danger of falling lines constitute a potential hazard such as to decrease the value of the property. Witnesses testified that the location of the property in question was particularly suited to the reception of television programs from a long distance and that the power line negated this advantage.

The Reasoning . . . The majority opinion was reasoned along these lines:

- The state constitution, which is self executing, states that property shall not be taken or damaged for public use except on due compensation.
- A state law permits the oil, gas, and electric industries to use highway rights-of-way and public lands to place poles, string lines, and run pipelines, but this law cannot conflict with the constitution.
- The State Highway Commission, which acquired the right-of-way in question, has no authority to pay for easements beyond those required for travel purposes.
- Even though courts have previously held that telephone or telegraph lines may not constitute additional servitude on highway rights-of-way because they replace messengers who would travel by surface, the Mississippi court said the previous opinions were not applicable. The majority reasoned that electric power lines have "no relation to promoting or lessening public travel over a highway."

Accordingly, the court held that the lower court was right in not issuing an injunction to prevent construction of the power lines and in not awarding punitive damages against the utility. However the high court ordered another trial to determine the extent of actual damages incurred as a result of the power line.

In reaching its decision, the Mississippi court said that it could not follow the ruling of a Washington State court which had held that power lines do not constitute an "unreasonable encroachment" on the rights of adjoining property owners. "We think," said the Mississippi court, "that the test should be whether or not the rights of an abutting landowner have been encroached upon at all, to his damage."

TECHNICAL NOTES

Duct-flushing removes highway de-icing salts and also acids and alkalis that may have collected in pockets in the duct-line into which a cable is to be pulled.

Surges in voltage and current caused by switching capacitor banks can be limited to negligible values by two-step switching that includes insertion of appropriate resistors.

Losses are usually lower for phase-to-phase coupling of carrier than with phase-to-ground coupling—the former provides a definite return path over wire. However, the latter is dominant practice because it is more economical.

Short circuit force calculations for enclosed-bus conductors will, if based on customary formulas for conductors in free space, be in gross error because the shielding efforts of the eddy currents in the sheath will have been ignored.

Paper drinking cups might be a good vehicle for communicating safety messages. Of employees using them average use is more than one a day.

Shielding of the top insulator in a switch stack as well as the parts of a 330-kv stack is desirable if radio interference is to be reduced to a practicable minimum.

Scranton Electric Gets Rate Hike

Pennsylvania PUC grants $804,956-a-year increase in revenues as compared with $1,201,315 requested by company

Return on fair value is equivalent to 7.29% on net original cost rate base, Pennsylvania PUC ruled in its order of Dec. 6

The Pennsylvania Public Utilities Commission granted the Scranton Electric Co a $804,956-a-year rate increase in its order dated Dec. 6. This was 67% of the $1,201,315 originally requested by the company. Scranton Electric, a subsidiary of the Pennsylvania Power & Light Co, has as its president, C. F. Nagel.

An item of unusual interest was the contention of the City of Scranton that the respondent of any utility could only earn on the fair value of the property, used and useful in public service. The order said: "The city contends that a portion of respondent's production capacity does not represent used and useful property since the city contends that respondent has an excess capacity with Unit No. 3 in service."

Stanton Unit Involved

The investment in dispute as not being used or useful was the latest 46,000-kw machine for the Stanton No. 3 Unit. The order, in dismissing the city's petition, said "The installation of Unit No. 3 at Stanton was founded upon consideration of respondent's load requirements. The size of the unit was a matter for determination by respondent itself, and, in the absence of any showing of errors in judgment by respondent affecting the public interest, we shall not disturb its decision. Beyond this, is the undisputed fact that with its largest unit out of service (the 46,000-kw Stanton No. 3 Unit), respondent would have been incapable of furnishing from its own facilities the Scranton area peak load it experienced on Dec. 21, 1953. In broad outline, it is a fundamental principle that electric generating capacity be designed so as to meet peak requirement when the largest generating unit is out of service.

C. F. NAGEL

"In the light of the foregoing, we conclude, subject to comment contained hereinafter, that all of respondent's plant in service at Dec. 31, 1953, allocated to electric service in the Scranton area is used and useful in the public service."

As to the rate base, five measures of value were considered by the commission. These were original cost and original cost trended for one, two, three, and five years' price levels.

The net original cost rate base was found by the commission to be $38,858,643 while the 1953 trended original cost price level produced a rate base of $60,379,602.

The commission found the fair value of the property used and useful in public service to be $47 million, or approximately equal to the gross original cost of plant of $47,148,895.

In its determination of the rate of return, the commission, after arriving at a cost of money of 5.72%, found "6% to be the fair rate of return for respondent to be applied to our fair value finding of $47 million, resulting in an allowable annual return of $2,820,000." The foregoing return on fair value is equivalent to 7.29% on the net original cost rate base.

As to the effect of possible economies following a merger of Scranton with Pennsylvania P&L, the order noted "that practically none of the savings anticipated by reason of a merger could be made within the first year after the merger and very little savings could be effected in the second year. The city's witness (Root) under cross-examination by respondent's counsel testified . . . that no significant savings could be effected in the first 24 months operation after merger."

The commission also accepted certain annualizations of operating expense with respect to the operation of the Stanton No. 3 Unit. The order said "Actual operating expenses for the year 1953 reflect operations with the new 40,000 kw (46,000 capability) generating unit in service for only the last three months of the year. Respondent estimates that if this new unit had been in service for the entire year of 1953, actual operating expenses would have been reduced by $273,216. This net decrease of $273,216 in operating expenses comprises four adjustments increasing expenses $331,344 annually and five adjustments decreasing expenses $604,560 annually." This, in effect, passes the benefits of the system's increased efficiency to the customers.

Dissenting Opinion

Commissioner Henry Houck, who dissented, said that he felt that the fair value of the rate base should have been found at $48.5 million instead of $47 million found by the commission. This was because ". . . the majority's finding of fair value, as compared with its finding in the 1953 case, fails to give respondent its net increase in original cost and, of course, gives no weight to two or three-year average prices, and this in spite of the fact that the trend of prices is still upwards. On the record I am unable to justify

a fair value finding of $47 million."

Furthermore, Commissioner Houck said "There is another consideration here involved. The rates in question were suspended by action of the commission and have not yet become effective. Throughout this suspension period the new plant has been in service. Obviously, respondent has been denied a return upon that new plant during the suspension period. The statute which governs us provides that when a new rate is suspended the commission shall consider the effect of such suspension in finally determining and prescribing the rates thereafter to be charged and collected. Under the majority's disposition of the case no consideration has been given to this statutory directive."

FINANCIAL BRIEFS

Kansas Gas & Electric Co is planning to sell $6 million preferred stock and $10 million bonds . . . **Missouri Utilities Co** has registered a plan with the Securities and Exchange Commission to offer 27,420 shares of common stock to its stockholders on a 1-for-10 basis . . . Federal Power Commission has authorized the **Pennsylvania Power & Light Co** to acquire remaining outstanding shares of preferred and common stocks of the Scranton Electric Co. PP&L now owns 91% of the Scranton stock.

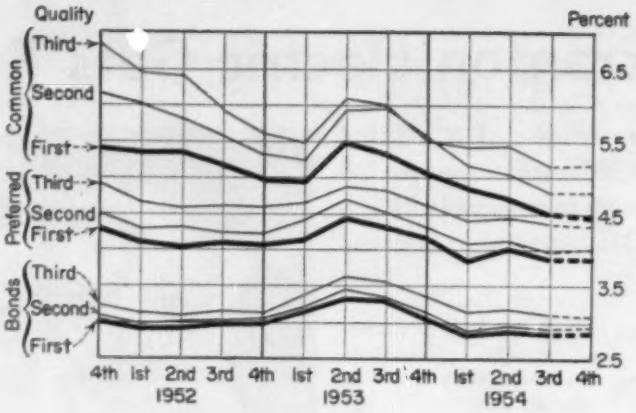
Florida Power & Light Co has sold its 29 ice manufacturing plants in Florida to City Products Corp.

Texas Utilities Co has added about 8¢ a share for its common stock in the first ten months of 1954 because of the repeal of the 2% penalty for filing consolidated federal tax return. Company will realize a further benefit in the last two months of 1954.

REGULATION BRIEFS

San Diego Gas & Electric Co has asked the California Public Utilities Commission approval to raise rates 18%. This will bring a 5.9% return on its capital investment as compared with an estimated 4.3% return it will realize in 1954.

Today's Utility Yields (%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY.....	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Dec. 23.....	2.89	2.92	3.11	3.90	4.04	4.38	4.36	4.70	5.20
Dec. 16.....	2.89	2.92	3.10	3.90	4.04	4.36	4.36	4.70	5.27

Data: Reis & Chandler, Inc.

Utility Earnings

COMPANY	PERIOD MONTHS ENDED		NET INCOME 1954	NET INCOME 1953	EARNINGS PER COMMON SHARE 1954	EARNINGS PER COMMON SHARE 1953
Arkansas Power & Light.....	12	Nov.	$8,287,820	$6,458,657	$....	$....
Central Vermont Public Service	12	Nov.	1,287,797	973,978	1.18(a)	.94(a)
Detroit Edison.....	12	Nov.	21,586,127	21,335,257	2.00(b)	2.00(b)
Houston Lighting & Power.....	12	Nov.	13,263,293	10,339,041	2.38(c)	1.99(c)
New York State Electric & Gas.	12	Nov.	9,301,647	8,878,434	2.56	2.48
Ohio Edison and subsidiary....	12	Nov.	20,132,196	19,026,965	2.99(f)	3.10(f)

Notes—(a) Based on 867,141 shares in 1954 and 805,984 shares in 1953; (b) Based on 10,874,838 shares in 1954 and 10,649,343 shares in 1953; (c) Based on shares outstanding at the close of respective periods; and (f) Based on 5,806,136 shares in 1954 and 5,278,306 shares in 1953.

Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
SCHEDULE FOR JANUARY—FEBRUARY			
BONDS AND DEBENTURES			BID DATE
Duke Power—1st mtg due 1975	$40,000	.....	Jan. 10
Commonwealth Edison—conv. debs due 2004	50,000	.....	Jan. 11
New England Power—1st mtg due 1985	25,000	.....	Jan. 18
Consumers Power—1st mtg due 1990	30,000	.....	Jan. 25
Los Angeles, Calif., Department of Water & Power—electric plant revenues	18,000	.....	Jan. 26
Dallas Power & Light—debs due 1980	7,000	.....	Feb. 14
Kansas City Power & Light—1st mtg due 1985	16,000	.....	Feb. 15
Texas Electric Service—1st mtg due 1985	17,000	.....	Feb. 23
Western Light & Telephone—1st mtg due 1985	3,000	.....	.....
PREFERRED STOCK			
Public Service Electric & Gas—250,000 sh $100 par cum	$25,000	.....	Jan. 12
Duquesne Light—160,000 sh $50 par	8,000	.....	Jan. 20
COMMON STOCK			
Duke Power—218,737 sh (to be offered commonholders on 1-for-20 basis, record Jan. 12 to expire Jan. 28, no underwriting)	$8,749	$40.00	5.00%
Western Light & Telephone—about 40,000 sh (to be offered commonholders on a 1- for-10 basis)	.....	.....	.....
Duquesne Light—450,000 sh	.....	.....	Jan. 17

SAVE

$64.25 PER 1000 FEET

with Kaiser Aluminum Triplex

As YOU SEE in the box below, when you switch from three open wire copper services to Kaiser Aluminum Triplex you save up to $64.25 per 1000 feet—based on reports from 10 utilities.*

You can be sure of getting the *maximum* savings from Kaiser Aluminum Triplex by taking full advantage of Kaiser Aluminum service. Experienced Kaiser Aluminum field engineers work with your crews right in the field where desired, demonstrate ways to speed installations and cut costs.

ACT NOW—as hundreds of power companies are doing! Convert to Kaiser Aluminum conductor easily, efficiently, economically—and save thousands of dollars a year. Contact any Kaiser Aluminum sales office listed in your telephone directory, or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc. General Sales Office, Palmolive Bldg., Chicago 11, Ill.; Executive Office, Kaiser Bldg., Oakland 12, Calif.

Kaiser Aluminum

The nation's largest producer of triplex and aluminum weatherproof conductor

Here is a typical example of the big savings possible with Kaiser Aluminum Triplex

INSTALLED COSTS FOR 10 SERVICE DROPS (Average Length of 100 ft.)

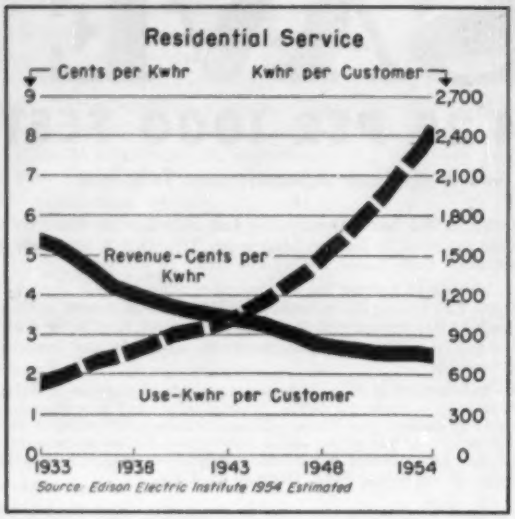
	#6 Solid TBWP Copper	#4 Kaiser Aluminum Triplex (Oyster)
Cost of conductor	$135.15	$103.00
Cost of pole taps, entrance connectors, house wireholders	15.30	14.70
Total materials cost	$150.45	$117.70
Total labor cost	80.80*	49.30*
TOTAL COST	$231.25	$167.00

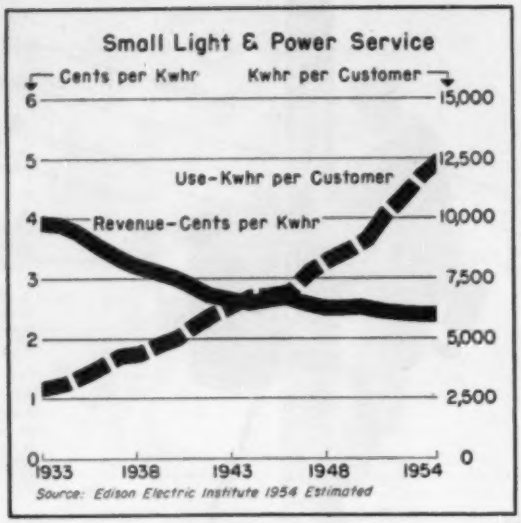
TOTAL SAVING—$64.25—PER 1000 FT.!

*Average labor costs based on reports from 10 utilities in various sections of the country that have switched from three open wire type service to Kaiser Aluminum Triplex.

If you have a question on accessories, your local Kaiser Aluminum conductor engineer will be glad to advise you. Call him now.

STATISTICS



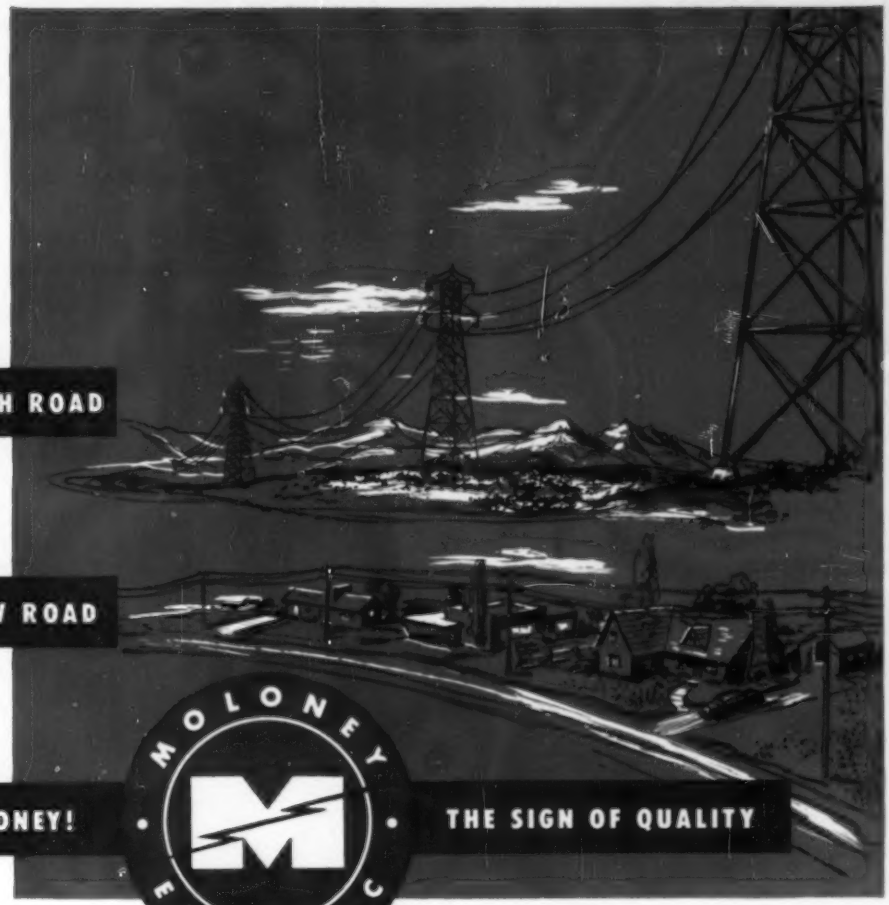


Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Oct.	100.01	99.16	88.62	12.9
Peak—Class I Systems	Oct.	79.9	79.4	74.0	8.0
Estimated Dec. '54 Peak	Sept.	87.8	88.0	91.2	—3.7
Production—billion kwhr	Sept.	39.55	41.17	37.03	6.8
hydro		7.80	8.34	7.59	2.8
fuel		31.74	32.82	29.44	7.8
Sales—billion kwhr	Oct.	33.75	34.05	32.21	4.8
residential		9.70	9.76	8.70	11.5
commercial		6.40	6.69	5.62	13.9
industrial		15.24	15.00	15.56	—2.1
other		2.41	2.60	2.33	3.4
Fuel Consumption	Sept.				
coal—million tons		9.73	9.83	9.67	0.6
oil—million barrels		4.90	4.85	6.16	—20.5
gas—billion cu ft		118.62	130.49	105.14	12.8
Net Income Class A & B Co's—$ millions	Sept.	92.41	89.43	80.66	14.6
Residential Customers—millions		42.95	42.84	41.79	2.8
revenue per kwhr	12 mos	2.70¢	2.70¢	2.75¢	—1.8
avg kwhr per customer	ended	2,512	2,496	2,317	8.4
avg annual bill	Oct.	$67.82	$67.39	$63.72	6.4

Business Statistics . . .

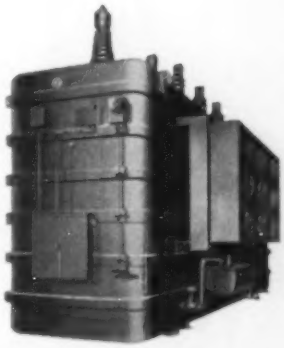
Indexes: 1947-49 = 100					
FRB Industrial Production	Nov.	130	130	130	....
ENR Construction Cost	Dec.	134.9	134.8	128.2	5.2
BLS Cost-of-living	Nov.	114.6	114.5	115.0	—0.3
NEMA Sales	Oct.				
insulation materials		117	123	154	—24.0
electric appliances		102	115	91	12.1
household refrigerators		51	73	46	10.9
Wholesale prices	Nov.				
motors and generators		121.8	121.8	124.3	—2.0
transformers and regulators		128.1	128.1	128.1	....
switchgear and fuses		135.2	135.1	135.0	0.1
Gross National Product					
annual rate—$ billion	3rd qtr	355.5	356.0	367.4	—3.2



Moloney Transformers, proven dependable performers, provide an uninterrupted flow of power . . . up along your high voltage transmission lines . . . down to your lower voltage distribution feeders.

Moloney has paved the highway of high voltage and Kva power transformers in their newly completed manufacturing bay . . . and Moloney HiperCore Transformers have provided dependable avenues of distribution . . . with no detours.

Whether you need high road power transformers . . . or low road distribution transformers . . . make them "Moloney All Along the Line." For Moloney is the "Sign of Quality" . . . of 58 years of experience in the exclusive production of transformers.



MOLONEY ELECTRIC COMPANY

Power Transformers • Distribution Transformers • Step Voltage Regulators • Regulating Transformers • Load Tap Changing Transformers • Load Center Transformers • Unit Substations • Network Transformers • Constant Current Transformers • Capacitors • Transformers For Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

5 Ratings allow for System Growth

THERE IS PLENTY OF ROOM for system growth because the *Vari-Amp* feature on these Allis-Chalmers single-phase power regulators permits operation at 5 ranges of regulation instead of one half-range setting. Initial cost is lower in most instances. In addition, the *Vari-Amp* feature provides extra short-circuit capacity. No other single-phase power regulator offers flexibility like this.

Unequal Range Gives Full 10% Buck Even at Increased Current Ratings

The *Vari-Amp* feature also permits retaining full 10% buck even at increased current ratings. Then the regulator operates at heavier loads in a "raise" direction . . . at lighter loads in a "lower" direction.

In addition to those important multiple ratings, you get low exciting current, low maintenance, and close, accurate control with Allis-Chalmers single-phase power regulators. Get the full story. Contact your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 01B6065C.

A-4461

Vari-Amp feature makes possible these additional ratings

2400	12	50 amp	57 amp	66.5 amp	80 amp	100 amp
	24	100	114	133	160	200
	36	150	171	200	240	300
	48	200	229	267	320	400
	60	250	286	334	400	
	72	300	343	400		
	96	400				
4800	12	25	28.6	33.3	40	50
	24	50	57	66.5	80	100
	36	75	85.7	100	120	150
	48	100	114	133	160	200
	60	125	143	167	200	250
	72	150	171	200	240	300
	96	200	229	267	320	400
	120	250	286	334	400	
	167	348	397			
6900	17.3	25	28.6	33.3	40	50
	34.5	50	57	66.5	80	100
	69	100	114	133	160	200

Extra Short-Circuit Capacity Available

25 times normal short-circuit capacity available with each of these current ratings gives short-circuit capacities as high as 10,000 amperes on smaller units.

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